Serrano Water District

2010 Urban Water Management Plan

June 2011

Karen E. Johnson, Water Resources Planning

Serrano Water District

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Prepared with Assistance from:
Karen E. Johnson, Water Resources Planning

Serrano Water District

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Michael Mastin	Water Quality / Treatment Plant Operations

Contact Sheet

Report Contact Person:	Tim DeTurk Associate General Manager Phone: 714/538-0079 e-mail: 4swdgm@yahoo.com
Date of Public Hearing:	June 14, 2011
Plan Adoption Date:	June 14, 2011
Resolution Number:	06-11-01
Plan Submitted to Department of Water Resources:	Before July 13, 2011
The water supplier is a:	Special District – retailer
Utility services provided by the water supplier include:	Water
Is the agency a Bureau of Reclamation Contractor?	No
Is the agency a State Water Project Contractor?	No
Plan Preparer:	Karen E. Johnson, Water Resources Planning kejwater@aol.com

Serrano Water District

2010 Urban Water Management Plan
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Section 1 – Plan Preparation

1.1 Background

Serrano Water District (District or SWD) is an independent water district established in 1927 under the California Water Code, with a five-member elected Board of Directors. The District serves potable water to a population of approximately 6,500 people in the City of Villa Park (Villa Park or City) and a small area of the City of Orange (Orange) within a 4.7 square mile area. The District service area, shown on Figure 1, is largely built out with primarily large lot single family homes, one shopping center and an office building, schools, and a City Hall complex.

This Urban Water Management Plan (UWMP) was prepared in response to the Urban Water Management Planning Act (Act), Water Code Sections 10610 through 10657, which were added by Statute 1983, Chapter 1009, and became effective on January 1, 1984. The Act requires that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually prepare and adopt an UWMP. The Act requires suppliers to describe and evaluate sources of water supply, efficient use of water, demand management measures, implementation strategies and schedules, and other relevant information and programs. Sections of this UWMP that correspond to the Act are summarized in Appendix A UWMP Checklist. References used in the preparation of this UWMP are listed in Appendix B.

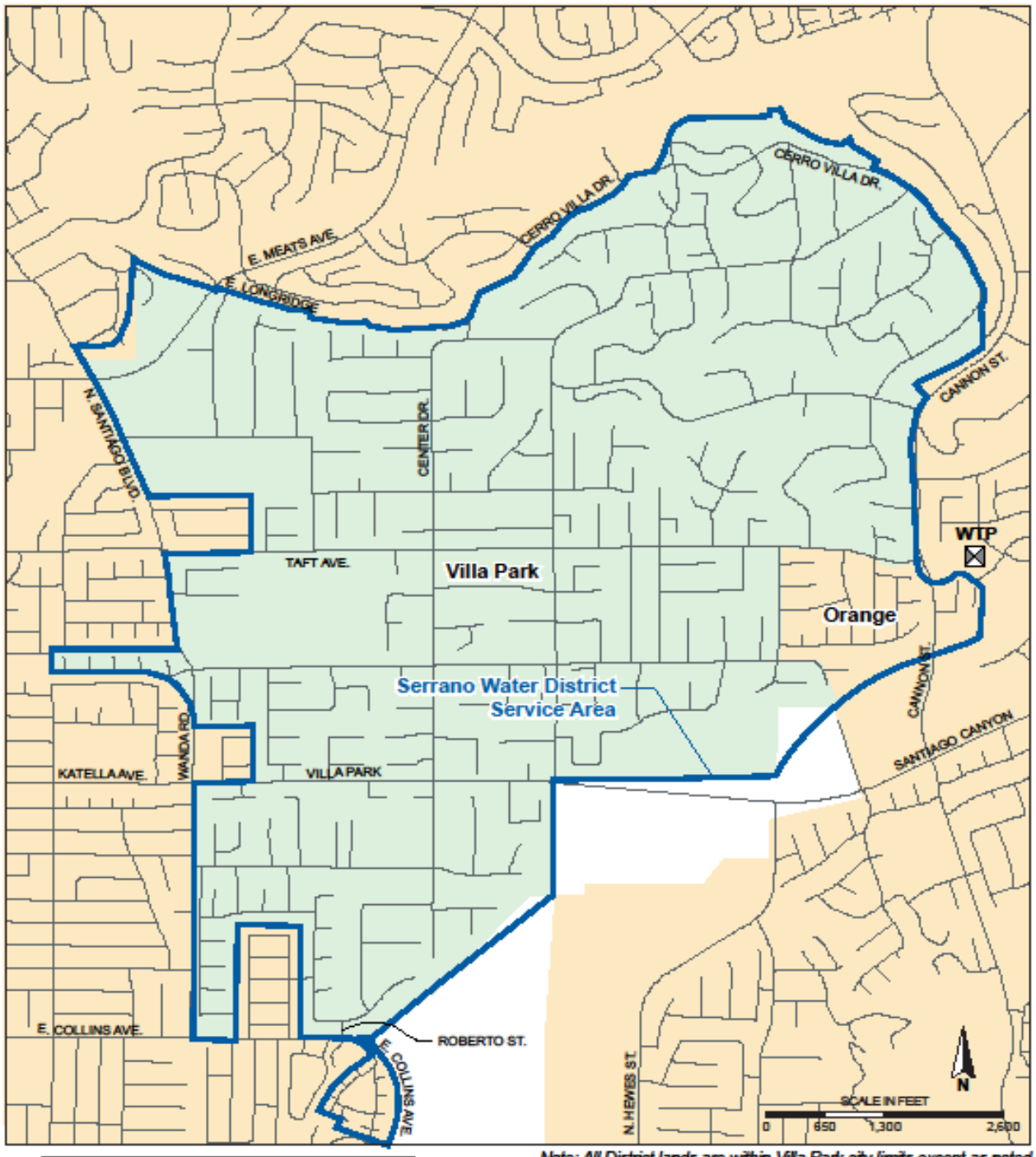
Many amendments have been added to the Act since UWMPs were last required in 2005; the most recent added in 2009. The most significant change is SBx7- 7 which requires urban suppliers to reduce the statewide average per capita daily water consumption by 20 percent by December 31, 2020. A summary of recent significant changes is provided.

AB 1376

This bill requires water suppliers to provide at least a 60 day notification of the public hearing to any city or county within which the supplier provides water.

AB1420

This bill requires urban water suppliers to implement water Demand Management Measures described in water code section 10631(f) to be eligible for any water management grants or loans awarded or administered by Department of Water Resources (DWR), State Water Resources Control Board (SWRCB), or California Bay-Delta Authority (CBDA) or its successor



Note: All District lands are within Villa Park city limits except as noted.

LEGEND

- Serrano Water District Service Area
- City of Orange
- City of Villa Park
- SWD WTP

Serrano Water District
Distribution System Area

Figure 1

agency (collectively referred to as "Funding Agencies"). The Demand Management Measures correspond to the 14 Best Management Practices listed and described in the California Urban Water Conservation Council Memorandum of Understanding. Determination of DMM compliance is based on an individual water agencies implementation or participation with a regional group. This bill is in effect until July 1, 2016 unless another statute is enacted.

SB 407

This bill requires multi-family and commercial properties to replace non-compliant plumbing fixtures with water conserving fixtures during building improvements or alteration. All single family homes must have non-compliant plumbing fixtures replaced by 2017 and all multi-family and commercial buildings by 2019.

SB1087

This bill requires UWMPs to include projected water use for single family and multi-family housing needed for lower-income households. This bill supports the requirements that suppliers grant a priority for the provision of service to housing units affordable to lower income households.

SBx7- 7

This bill requires all water suppliers to increase water use efficiency. The goal is to achieve a 20 percent reduction in statewide urban per capita water use by December 31, 2020. This bill also establishes an incremental goal of reducing per capita water use by 10 percent by December 31, 2015. Methods to determine targets to help achieve increased water use efficiency were established. The law is intended to promote urban water conservation standards consistent with CUWCC's adopted BMPs. An urban water supplier may update its 2020 urban water use target in its 2015 UWMP.

This UWMP was prepared in accordance with the requirements under the Act that urban water purveyors submit an UWMP to the DWR every five years. This 2010 version is the District's first UWMP. The City followed the DWR Guidebook and checklist in the development of this UWMP along with the guidelines on methodologies for calculating baseline and compliance urban per capita water use. Although not required to look beyond 20 years, the District included supply and demand data to the year 2035 to be consistent with other Municipal Water District of Orange County member agencies.

1.2 Coordination

The District is a member of the Municipal Water District of Orange County (MWDOC). MWDOC is a member agency of the Metropolitan Water District of Southern California (MWD), the regional wholesaler of imported water. MWDOC serves all of Orange County except for the cities of Anaheim, Fullerton, and Santa Ana which are member agencies of MWD. The District coordinated the development of this UWMP with MWDOC. In accordance with the Act, the District provided its imported water needs to MWDOC. MWDOC and MWD documented available quantities of imported supplies and reliability of those supplies for retailers in their respective regional UWMPs. References are made to these documents.

In addition to MWDOC, the District works closely with the Orange County Water District (OCWD) - the manager of the Orange County Groundwater Basin, and the cities of Villa Park and Orange. Most of the service area is within Villa Park, and a small portion of Orange is in the District service area. The City of Orange purchases surplus water supplies from the District.

District staff, with the assistance of a consultant – Karen E. Johnson, Water Resources Planning – prepared the 2010 UWMP in coordination with the agencies listed in Table 1. In preparing the UWMP, staff utilized the Department of Water Resources *Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan* (March, 2011), and other references listed in Appendix B.

Table 1

Coordination with Appropriate Agencies

Coordinating Agencies	Participated in Plan Development	Contacted for Assistance	Sent Copy of Draft Plan	Commented on Draft	Attended Public Meetings	Sent Notice of Intention to Adopt	Not Involved/ No Information
City of Orange		X	X			X	
City of Villa Park	X	X	X		X	X	
MWDOC	X	X	X			X	
Orange County Water District			X			X	
County of Orange			X			X	

1.3 Plan Adoption, Submittal, and Implementation

During the preparation of this UWMP, the District notified the cities of Villa Park and Orange within the service area of the District, as well as others listed in Table 1 of the undertaking of plan preparation and offered an opportunity to submit comments on the draft UWMP. As presented in Table 1, a draft version of the UWMP was sent to the cities and relevant water

purveyors. These entities were provided notification at least 60 days prior to the public hearing held on June14, 2011 of the place and time of the hearing and of the opportunity to comment on the draft.

Copies of the letters notifying the agencies listed in Table 1, along with public notices of the hearing encouraging the involvement of various community groups, letters of correspondence, and the adoption resolution are included in Appendix C. This 2010 UWMP was provided to DWR, the State Library, and entities receiving water within the District service area as well as other relevant entities, within 30 days after adoption. The draft plan was made available for public review before the public hearing; the adopted plan was made available for public review during normal business hours for at least 30 days following adoption. Active involvement in plan preparation by various elements of the population was encouraged through the public notices.

As required by *California Water Code* Section 10631(k), MWDOC provided its member agencies information that quantified water availability to meet their projected demands for the next 25 years, in five-year increments. Based on the projections of retail demand and local supply development provided by MWDOC's member agencies and the imported supply availability described in MWD's 2010 Regional UWMP (RUWMP), MWDOC provided data specific to each member agency to be used by that agency to update its own UWMP.

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Section 2 – System Description

2.1 District History

The District was first incorporated in 1876. In the early 1880s, farmers in Villa Park and El Modena areas joined together to build a dam on Santiago Creek to divert water from this tributary of the Santa Ana River to irrigate their fields and orchards. In 1927, several water companies merged into the Serrano Irrigation District to serve the Villa Park area. In 1928, the District, a public corporation organized under the laws of California, joined with Carpenter Irrigation District of El Modena and The Irvine Company for the construction of Santiago Dam which was completed in 1931; an agreement was made with the Irvine Company to allow the Irvine Company to divert water out of the watershed and to allocate water stored behind Santiago Dam between the three agencies. The lake was opened to the public for fishing in 1941. In 1956, MWD installed a pipeline to convey water to Irvine Lake. In 1963, the Villa Park Dam was dedicated primarily to provide flood control protection but is also used by the District for water supply when Irvine Lake has surplus water.

With the urbanization in the County starting in the late 1950s and the resulting decreasing need over time for agricultural water, Serrano Water District, providing irrigation water, and Villa Park Mutual Water Company, providing potable drinking water, merged in 1958 into one agency: Serrano Water District. Meanwhile, the Irvine Company received Carpenter Irrigation District's share of capacity in Irvine Lake in 1970, long before it was dissolved in 1998 with its few remaining customers annexed to the Irvine Ranch Water District (IRWD - successor to the Irvine Company).

The District now owns 50 percent of Irvine Dam; IRWD owns the other 50 percent. The District also owns approximately 25 percent of the water in Irvine Lake and IRWD owns the balance. The District is the managing agency for Irvine Lake facilities and recreation concessions.

2.2 Service Area Physical Description

The District provides, on average, 3,300 acre-feet per year (afy) or 3 million gallons per day (mgd) of potable water to residents and businesses within the City of Villa Park and a small area of the City of Orange. The service area is characterized by gently rolling hills and steeper hillside areas ranging in elevation from 280 feet (mean sea level) to 650 feet. There are very few vacant parcels available for development. The service area, presented on Figure 1, covers almost five square miles and has approximately 2,300 service connections for its 6,600 residents and handful of businesses. The service area boundary is similar to the Orange County

Local Agency Formation Commission designated Sphere of Influence for the District except for an area to the east off of the map that is served by another water purveyor and will not be served by the District in the future. As shown on the map, the majority of the service area is in Villa Park with two small areas in the City of Orange.

Surface water (local Santiago Creek water rights and imported MWD supply) is conveyed from Irvine Lake and treated at the District's Walter E. Howiler, Jr. Water Filtration Plant (WTP). This treatment facility is shown on Figure 1. On average, the treatment facilities produce 2,400 afy or about 2.2 mgd under average day conditions. About 1,200 afy, on average, is provided to District customers while approximately 1,200 to 1,500 afy is sold to Orange through two interconnections. These interconnections are at Lockett Reservoir and along Santiago Road at Wanda Street. The WTP has a capacity of 4 mgd to accommodate maximum day conditions. It is a direct filtration plant currently undergoing treatment process modifications (e.g., ozone and chloramines) to accommodate changing drinking water regulations.

The District has a contract with Orange specifying that it will make available a minimum of 1,000 afy of treated surface water (from SWD Santiago Creek water rights or imported from MWD), as available. IRWD has first right of refusal to purchase any and all surplus surface water stored in Irvine Lake. The District does not always have surplus surface water from Santiago Creek to sell to Orange; if interested, imported water can be purchased for Orange from MWD and stored, treated, and delivered by the District to Orange. The District has been able to provide approximately 1,240 afy on average and will attempt to continue to provide this quantity in the future.

Groundwater is pumped from the Orange County Basin using three wells with a total capacity of 4,300 gallons per minute (gpm). Groundwater production is approximately 2,100 afy. The distribution system contains approximately 220,000 linear feet of pipe with diameters ranging from 2- to 18-inches. More than half of that length is 8-inch diameter pipe. The system is divided into three pressure zones with each zone serviced by a pump station. Zone I, or the upper zone, serves customers from 400 feet to 585 feet in elevation. The lower zone, Zone II, services customers below 400 feet. A small closed zone – Zone III - was created to service a limited number of

customers on the north side of Cerro Villa Drive at 600 to 650 feet in elevation that previously had low pressure. Two reservoirs provide storage for the system (SWD, 2006).

2.3 Climate

The District service area is in a semi-arid environment with mild winters, warm summers, and moderate rainfall of approximately 14 inches per year, occurring primarily between October and April. The usually mild pattern is infrequently varied with periods of extremely hot weather and windstorms called the Santa Ana winds. The average maximum temperature is 77 degrees Fahrenheit and the average minimum temperature is 55 degrees Fahrenheit.

2.4 Service Area Population

The service area is almost entirely built out with few vacant parcels remaining. Villa Park, which has the smallest population in Orange County, comprises about 95 percent of the retail service area and is almost completely surrounded by Orange. The majority of lands are very low density residential uses with large homes. There is one 10 acre neighborhood shopping center which includes Villa Park City Hall, a small condominium project in Orange, and four public schools in Villa Park; the remainder of land use is very low density residential. According to the City, Villa Park's employment has not increased since these land uses were first occupied and projected jobs are anticipated to remain constant into the future (Villa Park, 2010). The shopping center has a high occupancy rate appearing to be unaffected by the current economic crisis. Current and projected population is presented in Table 2.

Table 2

Population — Current and Projected

	2010	2015	2020	2025	2030	2035	Data Source
Service Area Population	6,641	6,653	6,665	6,712	6,778	6,826	[1]

[1] Projected population for Villa Park from CDR, 2010 includes adjustment for population of City of Orange within SWD service area. Population for 2015 indicated a decline; data were equally distributed between 2010 and 2020.

Since the service area is almost entirely within Villa Park, its General Plan provides the policy framework and land use planning for most lands which the District serves. Villa Park's General Plan was recently updated; information provided here reflects the adopted plan. The City of Orange General Plan guides development for the small areas within the District service area (see Figure 1) but these areas are fully developed. There are a limited number of vacant parcels within Villa Park that are developable, with a development potential of approximately 20 dwelling units (DU) (Villa Park, 2011). These lands are general planned and zoned for Estate Low Density Residential at 1.75 DU per acre.

Most of the homes in Villa Park were built in the 1970's as the population increased from 2,723 in 1970 to 7,137 in 1980 (CDR, 2010). Population declined over the next 20 years to about 6,000 at 2000 as the original homeowner's children left home; a gradual increase has occurred since then with the 2010 population estimated at 6,307. Historical population estimates prepared for MWDOC by the Center for Demographic Research (CDR) at California State University Fullerton include the small areas of the City of Orange within the District service area, for a current service area population of approximately 6,612 for the entire District service area.

Villa Park has worked hard to maintain its rural single family residential community; its housing stock is very consistent, with large homes, well manicured front yards, and large landscaped backyards with pools. The median housing price in the City before the economic changes in 2007 was $1.3 million (Villa Park, 2010). With the high price of housing, young adults are not moving out of their family homes as early as with previous generations, and young parents are moving back into their childhood homes to live with their parents. The older generation is living with and helping care for grandchildren due to economic difficulties. Healthy older generations that do not need assisted living and are building secondary units on the property to live separately. With this trend of up to three generations living together longer, outdoor consumption for a household is not likely to change much but consumption per capita may decrease.

Other communities in the county and the state are experiencing densification of land reflecting the high price of land and building out of regions. The 1990 census indicated 3.3

persons per household in Villa Park, dropping to 3.07 in 2000, and increasing to 3.2 in 2009, reflective of a slight increase in household size yet overall a very stable population (CDR, 2011). With almost all of Villa Park developed and no change possible to its LAFCO Sphere of Influence for expansion, water demand projections were based on population projections adapted to developable lands. Demand projections presented in Section 3 reflect the development of all vacant parcels with the remainder of the increase in projected population assumed to be absorbed by increased densities of existing homes (e.g., new secondary units, more multigenerational households, etc.).

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Section 3 – System Demands

The past, current, and projected water consumption by type of use is discussed in this section along with projected water demands for planned low income households. Base period ranges used to establish the baseline per capita water demands and water use targets for 2015 and 2020 are presented here along with a plan for achieving the targets.

3.1 Baselines and Targets

This section describes the base period ranges used to establish the baseline per capita water demands. Water use targets in conformance with SBx7-7 are described for 2020 and the interim target of 2015.

3.1.1 Establishing Baselines

Table 3 presents the base period ranges for the District's 10 year (1999 through 2008) and five year (2004 through 2008) periods. The targets were developed for the individual agency, not MWDOC's regional alliance.

Table 3 (DWR Table 13)

Base Period Ranges

Base	Parameter	Value	Units
10 Year Base Period	2008 total water deliveries	3,298	afy
	2008 total volume of delivered recycled water (IPR)	18	afy
	2008 recycled water as a percent of total deliveries	0.5	percent
	Number of years in base period	10	years
	Year beginning base period range	1999	
	Year ending base period range	2008	
5 Year Base Period	Number of years in base period	5	years
	Year beginning base period range	2004	
	Year ending base period range	2008	

Table 4 lists the District population served, water supplied, and per capita consumption for each of the years within the 10 year baseline. The baseline daily per capita consumption for the 10 year period was 466 gpcd.

Table 4 (DWR Table 14)				
Base Daily Per Capita Water Use — 10 Year Range				
Base Period Year		**Distribution System Population**	**Daily System Gross Water Use (mgd)**	**Annual Daily Per Capita Water Use (gpcd)**
Sequence Year	**Calendar Year**			
1999	1999	6,305	2.97	472
2000	2000	6,277	3.17	505
2001	2001	6,362	2.88	453
2002	2002	6,450	3.05	473
2003	2003	6,490	2.85	439
2004	2004	6,534	2.84	435
2005	2005	6,542	3.10	474
2006	2006	6,542	3.08	471
2007	2007	6,543	3.21	490
2008	2008	6,567	2.94	448
Base Daily Per Capita Water Use				466

Table 5 lists the population served, water supplied, and per capita consumption for years within a five year range. The five year baseline is needed to determine whether the 2020 target meets the legislation's minimum water use reduction requirements of at least a five percent reduction per capita for this five year period. The baseline daily per capita consumption for the five year period was 464. 95 percent of the five year base is 441 gpcd. As discussed next under targets, 441 gpcd is higher than the 2020 target for the District of 373 gpcd, thus the District target is greater than a five percent reduction per capita.

Table 5 (DWR Table 15)				
Base Daily Per Capita Water Use — 5 Year Range				
Base Period Year		**Distribution System Population**	**Daily System Gross Water Use (mgd)**	**Annual Daily Per Capita Water Use (gpcd)**
Sequence Year	**Calendar Year**			
2004	2004	6,534	2.84	435
2005	2005	6,542	3.10	474
2006	2006	6,542	3.08	471
2007	2007	6,543	3.21	490
2008	2008	6,567	2.94	448
Base Daily Per Capita Water Use				464

3.1.2 Establishing Targets

DWR provided four different methods to establish water conservation targets.

- **Method 1 – Baseline Reduction Method.** The 2020 water conservation target of this method is defined as a 20 percent reduction of average per capita demand during the ten year baseline period described above. This equates to a 2020 target of 373 gpcd for the District, or 80 percent of 466 gpcd.

- **Method 2 – Efficiency Standard Method.** This target is based on calculating efficiency standards for indoor use separately from outdoor use for residential sectors and an overall reduction of 10 percent for commercial, industrial, and institutional (CII) sectors. The aggregated total of the efficiency standards in each area is then used to create a conservation target. This is not the best method to use for the District because of the lack of detailed landscape data by parcel and the target would likely remain much lower than with Method 1.

- **Method 3 – Hydrologic Region Method.** This method uses the ten regional urban water use targets for the State. A static water use conservation target for both 2015 and 2020 is assigned for Region 4: South Coast. The South Coast region target is 149 gpcd, reflecting a 20 percent reduction. The Method 3 target is based on the District reaching 95 percent of the South Coast region target, or 142 gpcd. This method was not chosen because the target is too aggressive and not realistic to achieve.

- **Method 4 – BMP Based Method.** This method uses specific data on previous water supplier BMP savings to establish a conservation target for 2020. Depending on how aggressively the water supplier has pursued water reduction and conservation in the past, a new conservation target for 2020 is assigned. This method was not chosen because specific data are not available on previous BMP/DMM efforts to be able to calculate savings; this data are typically developed for BMP MOU signers. Also, Method 4 is oriented towards systems with much lower outdoor landscaping water requirements and may place an undue burden on existing customers.

Individual District SBx7-7 Targets

Individual agency targets are needed to meet the 20 percent reduction in per capita use by 2020 goal and the interim water use efficiency target of 10 percent by 2015 set forth in the Water Conservation Act of 2009 (SBx7-7) which became law in November 2009. Methodology 1 was selected as the most appropriate methodology for the District to establish water use reduction targets to meet the requirements set forth in SBx7-7.

Methodology 1 requires a straightforward technical analysis of reducing the baseline per capita consumption by the targets. The District baseline per capita consumption identified in Table 4 is 466 gpcd. A 10 percent reduction by 2015 is 419 gpcd. A 20 percent reduction by 2020 is 373 gpcd.

The District is planning to use 438 afy of recycled water as indirect potable reuse by 2015 and 620 afy by 2020. The District use of indirect potable recycled water supply is discussed in detail under recycled water in Section 4. Use of indirect potable recycled water to meet demands will contribute to the District meeting its targets.

Regional Alliance

The District is participating in a regional alliance with MWDOC. MWDOC formed a regional alliance for its 28 member agencies, of which the District is a member, and three other agencies. Under the Orange County 20x2020 Regional Alliance, the entire region is able to benefit from local and regional investments, such as the Groundwater Replenishment System, recycled water, and water use efficiency programs that MWDOC and member agencies are implementing. MWDOC will provide annual monitoring and reporting for the Orange County region on progress toward compliance with the targets.

If the regional alliance meets its water use target, all agencies in that alliance are deemed compliant regardless of individual performance. If the Orange County 20x2020 Regional Alliance fails to meet its target, each individual supplier in Orange County, including the District, will have to meet its individual target. MWDOC calculated the regional target for the alliance as 156.5 gpcd at 2020 and 174.1 at 2015. This estimate was provided to the District in draft form and will be updated as MWDOC finalizes its UWMP.

3.2 Water Demands

The District has four billing classifications: residential (i.e., single family and one multi-family condominium project), commercial including institutional and governmental (i.e., shopping center, Villa Park government offices, and schools), landscape (e.g., Villa Park median strips and other turf irrigation), and agriculture (nurseries). There are no industrial uses. Table 6 presents the 2005 deliveries by water use sector. Table 7 includes a breakdown by percentage of each water use sector with almost 95 percent of the demands associated with residential uses. As discussed in Section 2, there is very little developable land in the service area which could accommodate additional development. Therefore the percentage of water deliveries by water use sector will not change significantly in the future.

Table 6 (DWR Table 3)					
Water Deliveries — Actual, 2005					
	2005 (acre-feet)				
	Metered		**Not metered**		**Total**
Water Use Sector	**# of Accounts**	**Volume**	**# of Accounts**	**Volume**	**Volume**
Single Family/Multi-family	2,323	3,295	0	0	3,295
Multi-family (inc. w/ SFR)	0	0	0	0	0
Commercial/Institutional/Government	18	156	0	0	156
Industrial (none)	0	0	0	0	0
Institutional (inc. w/ Commercial)	0	0	0	0	0
Landscape	56	17	0	0	17
Agriculture	3	5	0	0	5
Other	0	0	0	0	0
Total	2,400	3,473	0	0	3,473

Table 7 (DWR Table 4)						
Water Deliveries — Actual, 2010						
	2010 (acre-feet)					
	Metered			**Not Metered**		**Total**
Water Use Sector	**# of Accounts**	**Volume**	**Percent of Total Demand**	**# of Accts**	**Volume**	**Volume**
Single Family/Multi-family	2,323	3,296	94.9	0	0	3,296
Multi-family (inc. w/ SFR)	0	0	0	0	0	0
Commercial/Institutional/ Government	18	156	4.5	0	0	156
Industrial (none)	0	0	0	0	0	0
Institutional (inc. w/ Com.)	0	0	0	0	0	0
Landscape	56	17	0.5	0	0	17
Agriculture	3	5	0.1	0	0	5
Other	0	0	0	0	0	0
Total	2,400	3,474	100%	0	0	3,474

3.3 Water Demand Projections

Demand projections are identified here by water use sector, for planned low income housing, for sales to Orange, and for other water uses and losses.

3.3.1 Projections by Water Use Sector

Tables 8 through 10 present water demand projections based on a slight increase in population (as identified by CDR, 2010) through 2035. These gross demands were reduced to reflect planned conservation activities to meet the targets per SBx7-7 and were not reduced for indirect potable recycled water replenishment. The projected increase in population by 2035 is 185 additional people. The increase in population was applied to single family accounts/volume in Tables 5 through 7. It was assumed that approximately half of the increase in population can be absorbed in the developable lots (thus a slight increase in new residential accounts) with the balance absorbed in existing housing (secondary units, higher people per household, etc.).

Demand projections reflect the target 2015 and 2020 per capita unit demands. The assumed 50 percent of new demands associated with increased population absorbed in existing housing may have a lower per capita than the target baseline, but it was more conservative to assume the remaining 93 residents would have the target per capita demands.

Table 8 (DWR Table 5)

Water Deliveries — Projected, 2015

	2015 (acre-feet)				
	Metered		Not metered		Total
Water Use Sector	No. of Accounts	Volume	No. of Accounts	Volume	Volume
Single Family/Multi-family	2,325	2,967	0	0	2,967
Multi-family (inc. w/ SFR)	0	0	0	0	0
Commercial/Institutional/Government	18	141	0	0	141
Industrial (none)	0	0	0	0	0
Institutional (inc. w/ Com.)	0	0	0	0	0
Landscape	56	16	0	0	16
Agriculture	0	5	0	0	5
Other	0	0	0	0	0
Total	2,402	3,128	0	0	3,128

Table 9 (DWR Table 6)					
Water Deliveries — Projected, 2020					
	2020 (acre-feet)				
	Metered		**Not metered**		**Total**
Water Use Sector	**No. of Accounts**	**Volume**	**No. of Accounts**	**Volume**	**Volume**
Single Family/Multi-family	2,327	2,642	0	0	2,642
Multi-family (inc. w/ SFR)	0	0	0	0	0
Commercial/Institutional/Government	18	125	0	0	125
Industrial (none)	0	0	0	0	0
Institutional (inc. w/ Com.)	0	0	0	0	0
Landscape	56	14	0	0	14
Agriculture	3	5	0	0	5
Other	0	0	0	0	0
Total	2,404	2,785	0	0	2,785

Table 10 (DWR Table 7)						
Water Deliveries — Projected, 2025, 2030, 2035 (acre-feet)						
	2025		**2030**		**2035**	
	Metered		**Metered**		**Metered**	
Water Use Sector	**No. of Accounts**	**Volume**	**No. of Accounts**	**Volume**	**No. of Accounts**	**Volume**
Single Family/Multi-family	2,334	2,661	2,344	2,687	2,352	2,706
Multi-family (inc. w/ SFR)	0	0	0	0	0	0
Commercial/Institutional/ Government	18	126	18	127	18	128
Industrial (none)	0	0	0	0	0	0
Institutional (inc. w/ Com.)	0	0	0	0	0	0
Landscape	56	14	56	14	56	14
Agriculture	3	5	3	5	3	5
Other	0	0	0	0	0	0
Total	2,411	2,805	2,421	2,832	2,429	2,852

3.3.2 Lower Income Demand Projections

SB 1087 requires water providers to grant priority service hook-ups to lower income housing developments. The UWMP Act requires documentation of future water demands associated

with planned new lower income housing by the local land use planning jurisdiction. Villa Park has indicated that future low income housing is provided by secondary units. Secondary units are also called in-law units or granny flats. Approximately 50 percent of the increased population will be accommodated by increasing densities of people per dwelling unit (e.g., secondary units). However, under the General Plan Housing Element, only seven units are required. Using the 2020 target per capita demands of 373 gpcd (because secondary units have a lower per capita demand than large lot single family homes), the new demands associated with planned low income housing are 9.4 acre-feet by 2015, as rounded and presented in Table 11. The small area of Orange within the service area is built out with other areas of Orange available for new lower income housing.

Table 11 (DWR Table 8)

Lower Income Housing - Projected Water Demands (acre-feet)

Water Use Sector	2015	2020	2025	2030	2035
Single Family Residential	9	9	9	9	9
Multi-family Residential	0	0	0	0	0
Total	9	9	9	9	9

Source: City of Villa Park General Plan Housing Element, 2010.

3.3.3 Sales to Other Agencies

Past, current, and projected water sales to Orange are identified and quantified in Table 12. The Agreement for Purchase and Sale of Surplus Water between the District and the City of Orange is located in Appendix D.

Table 12 (DWR Table 9)

Sales to Other Water Agencies (acre-feet)

Agency	2005	2010[1]	2015	2020	2025	2030	2035
City of Orange[1]	1,355	1,240	1,240	1,240	1,240	1,240	1,240
Total	1,355	1,240	1,240	1,240	1,240	1,240	1,240

[1]2010 sales based on average of 2005 through 2009; the average was used for projections.

3.3.4 Other Water Uses and Losses

The only additional water uses are unaccounted for water or system losses, as presented in Table 13. The difference between water production and consumption is approximately five percent. This does not include evaporative losses at Irvine Lake since that determination requires a complex formula calculating stored native flow separately from stored imported water. It also does not include sales to Orange since its connection is near the WTP where

production is measured. Including sales to Orange would lower the percentage estimate of system losses.

Table 13 (DWR Table 10)							
Additional Water Uses and Losses (acre-feet)							
Water use	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Saline Barriers	0	0	0	0	0	0	0
Groundwater Recharge	0	0	0	0	0	0	0
Conjunctive Use	0	0	0	0	0	0	0
Raw Water	0	0	0	0	0	0	0
Recycled Water	0	0	0	0	0	0	0
System Losses[1]	174	174	156	139	140	142	143
Other (define)	0	0	0	0	0	0	0
Total	174	174	156	139	140	142	143

[1]System losses are unaccounted for water use, the difference between production and billed consumption. SWD system losses are approximately 5 percent and do not include sales to Orange.

3.3.5 Total Water Use

Total District water use and projected use is comprised of water deliveries, sales to the City of Orange, and unmetered water uses and losses, as presented in Table 14.

Table 14 (DWR Table 11)							
Total Water Use (acre-feet)							
Water Use	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Total Water Deliveries (from Tables 3 to 7)	3,473	3,469	3,128	2,785	2,805	2,832	2,852
Sales to Other Water Agencies (from Table 9)	1,355	1,240	1,240	1,240	1,240	1,240	1,240
Additional Water Uses and Losses (from Table 10)	174	174	156	139	140	142	143
Total	5,002	4,883	4,524	4,164	4,185	4,214	4,235

Table 15 presents demand projections provided by SWD to MWDOC. Sales to the City of Orange are not included. The new projections include the historical average annual sales to Orange of 1,240 afy.

Table 15 (DWR Table 12)							
SWD Demand Projections Provided to MWDOC (acre-feet)							
Wholesaler	Contracted Volume	2010	2015	2020	2025	2030	2035
MWDOC/MWD[1]	[2]	3,643	3,284	2,924	2,945	2,974	2,995

[1] Based on Table 14, but does not include sales to Orange. Provided to MWDOC May 2011.
[2] MWDOC's contracted volume with MWD is for total of all of its member agencies.

3.4 Water Use Reduction Implementation Plan

If the Orange County Regional Alliance does not meet its targets, the District will meet the SBx7-7 individual 2015 target of 419 gpcd and the 2020 target of 373 gpcd through the following passive and active activities. This implementation plan was presented at the District UWMP hearing for discussion.

Continue Implementing DMMs

DMMs implemented in the past which retain water savings, and current active activities undertaken by the District and MWDOC, are described in Section 6.

Increased District Use of Indirect Potable Recycled Water in Basin

As discussed under Recycled Water in this document, SBx7-7 allows urban retail suppliers to calculate a deduction for recycled water entering their distribution system indirectly through a groundwater source. This indirect potable reuse deduction was calculated by MWDOC for SWD based on a percentage of the total volume of water extracted from the Orange County Basin in a given year.

The District anticipates meeting 438 afy of demands at 2015 with indirect potable recycled water. 438 afy equates to 59 gpcd in the service area for 2015. The baseline per capita of 466 gpcd minus 59 gpcd is 407 gpcd, a 12 percent decrease by 2015. Thus the 2015 target will be achieved without any other action on the District's part.

Indirect potable recycled water use by 2020 is anticipated to be 620 acre-feet. This equates to 83 gpcd in the service area for 2020. The baseline per capita of 466 gpcd minus 83 is 383, thus requiring a further reduction of 64 acre-feet to meet the 2020 target. The results of the analysis are presented in the table below.

Water Use Reduction Analysis			
Demand Reduction	**Baseline**	**2015**	**2020**
SBx7-7Targets			
percent	0	10%	20%
Target acre-feet	3,469	3,128	2,785
gpcd Reduction	-	47	93
Target gpcd	466	419	373
GWRS IPR Demand Reduction			
acre-feet	-	438	620
gpcd	-	59	83
2009 Conservation Program Permanent Restrictions			
percent	-	3%	5%
acre-feet	-	104	173
gpcd	-	14	23
Total Reduction from Baseline			
percent	-	16%	23%
acre-feet	-	2,927	2,676
gpcd savings		73	106
Resulting gpcd	-	393	360

Water Conservation Program Permanent Restrictions

As discussed in Section 5, the District adopted a Water Conservation & Water Supply Shortage Program in 2009 (Appendix F). The permanent restrictions are effective at all times, not just during a shortage. The permanent restrictions are described here.

> **Section VI: Permanent Water Conservation Requirement – Prohibition Against Waste**
>
> The following water conservation requirements are effective at all times and are permanent. Violations of this section will be considered waste and an unreasonable use of water.

a. **Limits on Watering Hours**: Watering or irrigating of lawn, landscape or other vegetated area with potable water is prohibited between the hours of 10:00 a.m. and 4:00 p.m. Pacific Standard Time on any day, except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle

or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

b. **Limit on Watering Duration**: Watering or irrigating of lawn, landscape or other vegetated area with potable water using a landscape irrigation system or a watering device that is not continuously attended is limited to no more than fifteen (15) minutes watering per day per station. This subsection does not apply to landscape irrigation systems that exclusively use very low-flow drip type irrigation systems when no emitter produces more than two (2) gallons of water per hour and weather based controllers or stream rotor sprinklers that meet a 70% efficiency standard.

c. **No Excessive Water Flow or Runoff:** Watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive water flow or runoff onto an adjoining sidewalk, driveway, street, alley, gutter or ditch is prohibited.

d. **No Washing Down Hard or Paved Surfaces:** Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys, is prohibited except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high-pressure water broom.

e. **Obligation to Fix Leaks, Breaks or Malfunctions:** Excessive use, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected and in no event more than three (3) days of receiving notice from the Serrano Water District, is prohibited.

f. **Re-circulating Water Required for Water Fountains and Decorative Water Features**: Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited.

g. **Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a positive self-closing water shut-off nozzle or device. This subsection does not apply to any commercial car washing facility.

h. **Drinking Water Served Upon Request Only:** Eating or drinking establishments, including but not limited to a restaurant, hotel, cafe, cafeteria, bar, or other public place where food or drinks are sold, served, or offered for sale, are prohibited from providing drinking water to any person unless expressly requested.

i. No Installation of Single Pass Cooling Systems: Installation of single pass cooling systems is prohibited in buildings requesting new water service.

j. **No Installation of Non-re-circulating in Commercial Car Wash and Laundry Systems:** Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.
k. **Restaurants Required to Use Water Conserving Dish Wash Spray Valves**: Food preparation establishments, such as restaurants or cafes, are prohibited from using non-water conserving dish wash spray valves.
l. **Commercial Car Wash Systems:** Effective on January 1, 2009, all new commercial conveyor car wash systems must have installed operational re-circulating water systems, or must have secured a waiver of this requirement from the Serrano Water District.

The restrictions described above are anticipated to result in an approximately 3 percent reduction in demands by 2015 and a 5 percent reduction in demands by 2020. The water savings from these activities are presented in the table above to demonstrate the District's ability to meet the SBx7-7 target.

People per Dwelling Unit and Code-based Remodeling

The majority of Villa Park homes were built in the 1970's. According to the City, many homeowners build a secondary unit on the property and allow their grown children to move into the main house. With the high price of housing, young adults are not moving out of their family homes as early as with previous generations.

With this increasing trend of up to three generations living together longer, outdoor consumption per dwelling unit is not likely to change but consumption per capita will decrease. Population projections for this primarily built out community reflect this trend. In addition, new owners of very expensive homes such as those in Villa Park typically remodel. Remodeling will result in additional code based conservation fixtures and lower water use landscaping.

Price Effect

Water rate increases started in 2009 and will continue through 2011. The water rate increases will result in higher individual customer water bills which will raise awareness of water consumption. Raised awareness of water consumption usually results in changed behavior with a resulting decrease in water consumption.

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Section 4 – System Supplies

The District's primary water supplies are surface water from Irvine Lake and groundwater. These supplies are supplemented with imported MWD untreated supply. The District has rights to approximately 25 percent of the Irvine Lake inflow. Imported water from MWD is conveyed directly to Irvine Lake from MWD's Lake Mathews and is conveyed into the service area intermingled with the local surface water. Table 16 presents supplies available to the District under its current and projected supply portfolio. These supplies reflect gross water that could enter the District's distribution system as production quantities and includes sales to Orange. These supplies are described in this section.

Table 16

Water Supplies — Current and Projected (acre-feet)

Water Supply Sources		2010	2015	2020	2025	2030	2035
Water Purchased From:	Wholesaler Supplied Volume (yes/no)						
MWD/MWDOC [1]	No	2,838	2,838	2,838	2,838	2,838	2,838
SWD-produced Groundwater[2]		1,828	2,155	2,159	2,174	2,195	2,211
SWD-produced Surface Water[3]		2,750	2,750	2,750	2,750	2,750	2,750
Transfers In		0	0	0	0	0	0
Exchanges In		0	0	0	0	0	0
Recycled Water (IPR not included here)		0	0	0	0	0	0
Desalinated Water		0	0	0	0	0	0
Other		0	0	0	0	0	0
Total		7,416	7,743	7,747	7,762	7,783	7,799

[1]Imported supplies based on maximum purchase within past 10 years.
[2]Projected groundwater supplies reflect 62 percent BPP applied to projected demands.
[3]Local surface water based on 2006 average and includes sales to City of Orange.

4.1 Local Surface Water

4.1.1 District Use

The District utilizes local surface water from the Santiago Creek watershed. Santiago Reservoir is commonly referred to as Irvine Lake. Irvine Lake was formed by Santiago Dam No. 75 (Santiago Dam), built in 1931. Irvine Lake captures flows from Santiago Creek and its tributaries above Santiago Dam within a 61 square mile watershed; the reservoir has a maximum capacity

of 28,000 acre-feet. The District has water rights to approximately 25 percent of the supply flowing into Irvine Lake; availability is subject to precipitation in the watershed and varies year to year. IRWD owns the remaining 75 percent. The Operating Agreement between the Irvine Company and Serrano Irrigation District can be found in Appendix E.

Villa Park Dam is downstream of Irvine Lake and is owned and operated by the Orange County Public Works Engineering Department for flood control purposes. Villa Park Dam captures spills from Irvine Lake during times of heavy precipitation as well as runoff from Fremont and Weir canyons. The last overflow event during the planning period was December 2010 preceded by January/February 2005. The District has rights to this supply after April 1 of each year which is accounted for within the Irvine Lake local surface supplies. Quantities presented in Table 16 represent an average year (2006) yield and include water sold to the City of Orange.

4.1.2 Exported Water Volume

The District sells treated water to the City of Orange through interconnections with the distribution systems. The interconnections are: at Lockett Reservoir, and in North Wanda Road at Santiago Boulevard. Water is metered and sold to the Orange from these two locations. Approximately 1,240 afy have been sold, on average, to Orange over the previous five years (2005 through 2009). Actual sales varied from a low of 477 acre-feet to a high of 1,548 acre-feet. Historical sales were averaged to provide future quantities, as presented in Table 9, Sales to Other Agencies.

4.2 Groundwater Resources

The District owns and operates three wells (Well Nos. 3, 4, and 5) which provide approximately 2,200 afy or 63 percent of the historical supply. Well Nos. 3 and 5 are the largest producers pumping an average of 2,000 afy. The three wells have a total capacity of 4,300 gallons per minute (gpm). As described below, groundwater quantities in Table 16 are based on a Basin Production Percentage (BPP) of 62 percent, although this amount has been and can be exceeded at a higher cost. Using 62 percent is relatively conservative as the BPP has historically been closer to 67 and 70 percent and it is anticipated that the BPP may increase by 2020. MWDOC used 62 percent in its 2010 RUWMP.

4.2.1 Orange County Groundwater Basin

District wells pump from the Lower Santa Ana River Basin within the Orange County Groundwater Basin (Basin), managed by the Orange County Water District (OCWD). The Basin has not been adjudicated. Producer's rights consist of municipal appropriators' rights and may

include overlying and riparian rights. An average of 217,800 afy has been pumped over the last five years.

OCWD manages the Basin under the Orange County Water District Act, Water Code App., Ch 40 (Act) which is described in numerous OCWD documents including the MWDOC Regional UWMP 2010. OCWD manages the basin for the benefit of municipal, agricultural, and private groundwater producers and is responsible for the protection of water rights to the Santa Ana River in Orange County as well as the management and replenishment of the Basin. The groundwater basin, which underlies north and central Orange County, provides approximately 66 percent of the water needed in that area; imported water meets the balance of the water demand. Groundwater is pumped by producers before being delivered to customers.

The framework for basin production management is based on establishing the BPP. BPP is the ratio of groundwater production to total water demands expressed as a percentage and applied uniformly to all producers on an annual basis. Pumping below the BPP, the District is charged a fee on a per acre-foot basis, called the Replenishment Assessment (RA). Groundwater production above the BPP is charged the RA and the Basin Equity Assessment (BEA), which is set so that the cost of pumping above the BPP reflects the costs of importing water to use to replenish the Basin. Thus a financial disincentive is provided for production above the BPP. The OCWD Board of Directors can annually adjust the BPP. The BPP was established at 75 percent from 1993 to 2007 and reduced to 62 percent in water year 2009-10. It was lowered to reduce the accumulated overdraft in the Basin. The BPP is not an extraction limitation - exceedences result in financial assessments on excess production.

Description of Basin. According to the MWDOC 2005 RUWMP, the Orange County Groundwater Basin is dominated by a deep structural depression containing a thick accumulation of fresh waterbearing interbedded marine and continental sand, silt and clay deposits. The proportion of fine material generally increases toward the coast, dividing the Basin into Forebay and pressure areas. Consequently, most surface water recharge is through the coarser, more interconnected and permeable forebay deposits. Strata in this Basin are faulted and folded, and may show rapid changes in grain size. The Newport-Inglewood fault zone parallels the coastline and generally forms a barrier to groundwater flow. Erosional channels filled with permeable alluvium break this barrier in selected locations called “Gaps’. In addition to this geologic feature, increased pumping from inland municipal wells causes the coastal gaps at Talbert, Bolsa, Sunset, and Alamitos to be susceptible to seawater intrusion. The sediments containing easily recoverable fresh water extend to about 2,000 feet in depth near center of the Basin. Although water-bearing aquifers exist below that level, water quality and pumping lift make these materials economically unviable at present. Well yields range from 500 to 4,500 gallons per minute, but are generally 2,000 to 3,000 gallons per minute.

Upper, middle, and lower aquifer systems are recognized in the basin. The upper aquifer system, also known as the "shallow" aquifer system, includes Holocene alluvium, older alluvium, stream terraces, and the upper Pleistocene deposits represented by the La Habra Formation. It has an average thickness of about 200 to 300 feet and consists mostly of sand, gravel, and conglomerate with some silt and clay beds. Generally, the upper aquifer system contains a lower percentage of water-bearing strata in the northwest and coastal portions of the area where clays and clayey silts dominate. Accordingly, recharge from the surface to the groundwater basin may be minor in these areas. Recharge to the upper aquifer system occurs primarily in the northeastern portions of the Basin. With the exception of a few large system municipal wells in the cities of Garden Grove, Anaheim, and Tustin, wells producing from the shallow aquifer system predominantly have industrial and agricultural uses. Production from the shallow aquifer system is typically about five percent of total Basin production. The middle aquifer system, also known as the "principal" aquifer system, includes the lower Pleistocene Coyote Hills and San Pedro Formations, which have an average thickness of 1,000 feet and are composed of sand, gravel, and a minor amount of clay. The primary recharge of the middle aquifer system is derived from the Santa Ana River channel in the northeast of the County. The middle aquifer system provides 90 to 95 percent of the groundwater for the Basin.

The lower aquifer system (or deep aquifer) includes the Upper Fernando Group of upper Pliocene age and is composed of sand and conglomerate 350 to 500 feet thick. Logs of this aquifer indicate that it would probably yield large quantities of fresh water to wells, but this zone has been found to contain colored water, and the aquifer is too deep to economically construct production wells. With the exception of several production wells, few wells penetrate the deep aquifer system. Increasing accumulated overdraft of the Basin since the late 1990s has prompted increased evaluation of the Basin's yield and how the yield can be optimized through projects and programs. As a response to various factors, including a series of years with below average precipitation and the increased accumulated overdraft, in 2003 OCWD reduced the BPP to decrease pumping from the Basin. Currently, groundwater is produced from approximately 500 active wells within the Basin, approximately 300 of which produce less than 25 afy. Groundwater production from approximately 200 large capacity or large system wells operated by the 21 largest water retail agencies account for an estimated 97 percent of the total production. All but three of these large retail agencies, the cities of Anaheim, Fullerton, and Santa Ana, are within the MWDOC service area.

Groundwater production is generally distributed uniformly throughout the majority of the Basin with the exceptions of the Irvine and Yorba Linda subbasins, the immediate coastal areas, and the foothill margins of the Basin, where little to no production occurs. Increases in coastal production would lead to increased stress on the Talbert and Alamitos Barriers, requiring additional barrier capacity.

Working closely with OCWD, MWDOC has developed a water balance model, which incorporates OCWD's operating policies in managing the Basin. It is used to project the groundwater production for each producer in the Basin based on a range of assumptions provided by OCWD. Most of the assumptions involve replenishment supplies to the Basin. Historical groundwater flow was generally toward the ocean in the southwest, but modern pumping has caused groundwater levels to drop below sea level inland of the Newport-Inglewood fault zone. This trough-shaped depression encourages sea water to migrate inland, which if unchecked, could contaminate the groundwater supply. Strategic lines of wells in the Alamitos and Talbert Gaps inject imported and reclaimed water to create a mound of water seaward of the pumping trough to protect the Basin from seawater intrusion. In addition to operating the percolation system, OCWD also operates the Talbert Barrier in Fountain Valley and Huntington Beach, and participates in the financing operation of the Alamitos Barrier in Seal Beach and Long Beach. The barriers help prevent seawater intrusion and also help refill the Basin (MWDOC RUWMP 2005).

Recharge Supplies. Sources of recharge water include Santa Ana River base flow and storm flow, Santiago Creek flows, imported supplies purchased from MWD, supplemental supplies from the upper Santa Ana River watershed, and purified water primarily from the Groundwater Replenishment System (GWRS). The GWRS - the world's largest wastewater purification system for indirect potable reuse - is located in Fountain Valley and takes highly treated wastewater and purifies it. The recycled supply is then used to recharge the Basin through spreading grounds along the Santa Ana River. The OCWD Groundwater Management Plan Update can be found in the electronic version of Appendix E of this report. The GWRS is to be expanded before 2015.

Basin Overdraft. DWR has not identified the Basin as overdrafted. OCWD's Act defines annual basin overdraft to be the quantity by which production exceeds the natural replenishment of groundwater supplies during a water year. Efforts undertaken by OCWD to eliminate long term overdraft in the Basin are described in OCWD's Master Plan and Groundwater Management Plan Update.

The accumulated overdraft is defined by the Act to be the quantity of water needed in the Basin Forebay to prevent landward movement of seawater into the fresh groundwater body. However, seawater intrusion control facilities have been constructed and are planned for construction since the Act was written, and have been effective in preventing landward movement of seawater into the fresh groundwater body. These facilities allow greater utilization of the Basin's storage capacity. In addition, spreading grounds adjacent to and within the Santa Ana River are managed to maintain groundwater levels.

4.2.2 Groundwater Recently Pumped

The amount of groundwater pumped by the District over the previous five years is presented in Table 17. The volume pumped is determined by demands and availability of local surface water. The wells have a greater production capacity than what is needed under average water year conditions, to ensure reliability of the system and to meet demands when the availability of local surface supplies is reduced due to climatic conditions or if a well is off-line. There were no limitations or challenges in obtaining groundwater during this five year period.

Table 17 (DWR Table 18)

Groundwater — Volume Pumped by SWD (acre-feet)

Basin Name	Metered or Unmetered	2006	2007	2008	2009	2010
Orange County Basin	Metered	2,254	2,467	2,234	1,823	1,828
Total Groundwater Pumped		2,254	2,467	2,234	1,823	1,828
Groundwater as a Percent of Total Water Supply		65	69	68	57	65

4.2.3 Groundwater Projected to be Pumped

Table 18 presents the amount of groundwater projected to be pumped by the District. This projected amount is based on the current BPP for the Orange County Basin of 62 percent with no BEA. There are no changes or expansions planned for this groundwater supply at the present time. The District's existing production facilities have capacity to accommodate these demands on the system.

Table 18 (DWR Table 19)

Groundwater — Volume Projected to be Pumped by SWD (acre-feet)

Basin Name	2015	2020	2025	2030	2035
Orange County Basin[1]	2,155	2,159	2,174	2,195	2,211
Percent of Total Water Supply	62	62	62	62	62

[1]Based on BPP of 62 percent.

4.3 Imported Purchases

MWD imports supplies to the region for MWDOC to wholesale to the District. During the previous five years, the District purchased imported water during two years: 2007 and 2008. Quantities presented in Table 16 (2,838 afy) represent the maximum annual amount of imported water purchased by the District from MWDOC/MWD in the past ten years, which was

in 2003. The maximum amount was used because it is available to the District to augment its local supplies when necessary.

4.3.1 MWD Wholesale Supplies

Approximately 17.7 million Southern Californians rely on MWD for imported water. MWD wholesales imported water supplies to member cities and water districts in six Southern California counties. Since 1983, the total regional retail water demands within MWD's service area increased from about 3 million acre-feet to 4.1 million acre-feet over a 20 year period. MWD has provided between 45 and 60 percent of the municipal, industrial, and agricultural water used in its nearly 5,200 square-mile service area. The remaining supply comes from local wells, local surface water, recycled water supplies, and from the City of Los Angeles's aqueduct in the eastern Sierra Nevada.

Historically, MWD has been responsible for importing water into the region through its operation of the Colorado River Aqueduct and its contract with the State of California for State Water Project (SWP) supplies. Over the past decade supplies from the Colorado River have averaged 1.2 million acre-feet. Supplies from the SWP over the same period have averaged 700,000 acre-feet of water. The future reliability of these supplies is increasingly uncertain; however, MWD has increased its ability to supply water, particularly in dry years, through the implementation of storage and transfer programs. The adopted MWD 2010 RUWMP provides detailed documentation of current and projected MWD facilities and imported water deliveries to ensure supply reliability.

4.3.2 MWDOC's Role

MWDOC is a regional water wholesaler and resource planning agency, managing all of Orange County's imported water supply to 30 retailers with the exception of water imported to the cities of Anaheim, Fullerton, and Santa Ana. These entities, comprised of cities and water districts, are referred to as MWDOC member agencies and provide water to approximately 2.3 million customers in a 600 square-mile service area. MWDOC is MWD's third largest member agency. To aid in planning future water needs, MWDOC works with its member agencies each year to develop a forecast of future water demand. The result of this coordination effort allows MWDOC to forecast the imported demand by subtracting total demand from available local supplies. MWDOC then advises MWD annually (in April of each year) of how much water MWDOC anticipates to purchase during the next five years (MWDOC, 2005).

4.3.3 SWD Imported Purchases

Currently, approximately 15 percent of the District's supply needs are met by water imported by MWD through MWDOC, when local supplies are limited. Lake Mathews, a 39 square mile

watershed drained by Cajalco Creek, is located in western Riverside County east of the Santa Ana Mountains, 10 miles southwest of the City of Riverside. Lake Mathews was constructed in the 1930's as the terminal reservoir for MWD's Colorado River Aqueduct. It also receives local runoff, and has received about four percent of SWP water and, as of recently, is capable of receiving a greater quantity of SWP supply (or other supplies conveyed through the California Aqueduct) via MWD's Inland Feeder. When the District purchases untreated imported water, it is delivered from Lake Mathews via the Lower Feeder and Santiago Lateral to Irvine Lake.

The imported District supplies indicated in Table 16 represent the maximum annual purchase made by the District during the past 10 years. This supply is typically purchased for immediate use or for storage for use in future years. Purchased water is very complicated to present in this report because the imported MWD supply is purchased for direct District use, stored for future District use, for sale to Orange after treatment, purchased for IRWD and OCWD exchanges, and other arrangements.

The amounts purchased for District use varies greatly from the amount used each year due to the benefits of Irvine Lake storage capabilities. During the five year period of 2005 through 2009, the District purchased water during two years: 708 acre-feet in 2007 and 1,900 acre-feet in 2008. The amount of imported water used during this five year period was 2,307 acre-feet, during 2008 and 2009, augmented with previously purchased supplies.

Table 19 presents the wholesale provider's estimate of available supply. MWD, and therefore MWDOC, have indicated in their 2010 RUWMPs that over 100 percent of demands during all year types will be met between 2015 and 2035.

Table 19 (DWR Table 17)

Wholesale Supplies — Existing and Planned Sources of Water (afy)

Wholesale Sources	Contracted Volume	2015	2020	2025	2030	2035
Groundwater	0	0	0	0	0	0
Surface Water	0	0	0	0	0	0
Imported Water	Based on Total MWDOC Entitlement	2,838	2,838	2,838	2,838	2,838
Recycled Water: IPR[1]	0	438	620	620	620	620

[1]Provided by MWDOC, 2011.

The reliability of MWD's supply was addressed in its 2010 RUWMP and in MWDOC's 2010 RUWMP and is summarized in Section 5. MWD ensures a highly reliable supply of water – over 100 percent of average annual demands – to its member agencies during average, dry year, and multiple dry years. The District will continue to purchase MWD water as a supplemental supply during years when local supplies do not meet demands or for operational purposes in keeping the WTP producing consistently.

4.4 Transfer and Exchange Opportunities

MWD, MWDOC, and OCWD have and will continue to explore opportunities for water exchanges and transfers that benefit the region. These opportunities are discussed under Future Water Projects at the end of this section. Water transfer opportunities using MWDOC and MWD facilities as well as in-lieu options with OCWD and others are obtainable, if necessary. However, based on the current availability of groundwater, local surface water, and imported supplies, no water transfers are being considered by the District at this time, as indicated in Table 20.

Table 20
Transfer and Exchange Opportunities

Transfer Agency	Transfer or Exchange	Short Term or Long Term	Proposed Volume (afy)
None anticipated at this time			
Total			0

4.5 Desalination Water Opportunities

Currently there are no identified District desalination projects for either ocean water or impaired groundwater. Ocean water desalination projects being planned by MWDOC at Huntington Beach and Dana Point will benefit the region and therefore indirectly benefit the District. These projects are discussed under Future Water Projects at the end of this section.

4.6 Recycled Water Opportunities

Recycled water provides a reliable and drought proof water source and could greatly reduce the region's reliance on imported supplies. Currently the District does not utilize or serve directly applied recycled water to any of its customers. However, the District pumps groundwater from the Basin which is protected through seawater intrusion barriers and enhanced with groundwater recharge facilities, both owned and operated by OCWD after further treating Orange County Sanitation District's (OCSD) highly treated wastewater effluent. The District indirectly benefits from this regional use of recycled water.

4.6.1 Wastewater System Description and Wastewater Disposal

OCSD operates the third largest wastewater system on the West Coast, consisting of nearly 600 miles of trunk sewers, two regional treatment plants, and an ocean discharge system. The City of Villa Park owns and operates the sanitary sewer collection system in coordination with OCSD who owns, operates, and maintains the trunk system. The trunk system conveys flow to OCSD's

treatment facilities. The OCSD has an extensive system of gravity flow sewers, pump stations, and pressurized sewers called force mains.

The Villa Park sewer system was constructed primarily in the 1960's and 1970's and is built out. It has approximately 153,000 linear feet of collector and trunk sewer mains ranging in size from 8 to 15 inches in diameter. Some of the trunk mains are joint use mains with the City of Orange. A "Sewer Service User Charge", which is assessed on the property tax role and based on land use, is for maintenance and rehabilitation of the sewer system within the City. The Orange County Sanitation Districts, of which Villa Park is a member, assesses a "sewer hook-up fee" and a "sewer acreage fee" to support the regional treatment facilities, operations, and new trunk lines.

OCSD's Reclamation Plant No. 1 is located in the City of Fountain Valley about four miles northeast of the ocean adjacent to the Santa Ana River. The plant provides advanced primary and secondary treatment and supplies secondary treatment water to OCWD which further treats and distributes the water for various uses, including irrigation, groundwater recharge, and operation of coastal seawater barrier system.

The treatment process at Reclamation Plant No. 1 includes secondary treatment through an activated sludge system. This plant receives raw wastewater from six interceptors. The secondary effluent is either blended with the advanced primary effluent and routed to the ocean disposal system, or is sent to OCWD facilities for advanced treatment and recycling. The solid materials removed in the treatment systems are processed in large tanks to facilitate natural decomposition. Half of the material is converted to methane, which is burned as fuel in the energy recovery system, and the remaining solids are used as a soil amendment or fertilizer in other southern California counties.

OCSD's Treatment Plant No. 2 is located in the City of Huntington Beach about 1,500 feet from the ocean adjacent to the Santa Ana River. This plant provides a mix of advanced primary and secondary treatment. The plant receives sewage through five major sewers. The treatment process is similar to Plant No. 1. Approximately 33 percent of the influent receives secondary treatment through an activated sludge system, and all of the effluent is discharged to the ocean disposal system. OCSD's treated wastewater that is not recycled by OCWD is discharged through an ocean outfall at a depth of approximately 200 feet below sea level and nearly five miles offshore from the mouth of the Santa Ana River.

4.6.2 Current Recycled Water Use

Due to its distance to the source of recycled water at Reclamation Plant No. 1, the District does not utilize recycled water directly at this time. It is assumed that wastewater generated within

the District service area treated to recycled water standards is proportionate to the total amount recycled from Reclamation Plant No. 1 versus the balance discharged to the ocean (see Table 21). Quantities of wastewater generated are generally proportional to the population and water use in the service area. Estimates of wastewater flows from the service area are presented in Table 21. Flows were calculated using population projections from Table 2 and an assumed a unit flow coefficient of 110 gpcd.

Table 21

Recycled Water — Wastewater Collection and Treatment

Type of Wastewater	2005	2010	2015	2020	2025	2030	2035
Wastewater Collected and Treated in Service Area[1] (mgd)	0.72	0.73	0.73	0.73	0.74	0.75	0.75
Volume that Meets Recycled Water Standard[2]	12%	68%	67%	67%	66%	62%	61%

[1]Based on population from Table 2 and unit flow coefficient of 110 gpcd.
[2] Total percent of Plant No. 1 effluent planned to be recycled by OCSD and OCWD. Data provided by MWDOC, 2011.

Table 22 presents quantities of recycled water that may not be recycled, and its disposal method. Although wastewater generated from the District service area is combined with other flows in the collection system, it was assumed that the amount recycled is proportional to the total amount of effluent recycled by OCSD and OCWD versus what OCSD discharges to the ocean. Capacity is limited by the supply of secondary treated wastewater from OCSD. OCSD constructed a pump station in 2009 to increase capacity and will expand its secondary treatment processes in late 2011 to increase capacity by 17,000-20,000 afy. This second phase expansion will be on-line by 2015 with a third expansion currently being planned to follow shortly afterwards.

Table 22

Recycled Water — Non-recycled Wastewater Disposal (afy)

Method of Disposal	Treatment Level	2010	2015	2020	2025	2030	2035
Ocean Outfall	Primary and Secondary	34,663	51,800	51,800	54,824	63,112	67,256
	Total	34,663	51,800	51,800	54,824	63,112	67,256

Source: MWDOC, 2010

4.6.3 Potential and Projected Uses of Recycled Water

Because of the District's long distance to a recycled water source, and OCWD's lack of infrastructure to deliver the supply, it is not anticipated that recycled water will be made available to the District in the foreseeable future. The District recognizes that if recycled water becomes available, there are several school grounds located in the northwest and west-central area of the service area that could be irrigated with the supply, but its feasibility would depend on additional investigations. There are no industrial uses in the service area and landscaping demands for the limited commercial and extensive low density residential land uses would not likely be cost effective to support the cost of infrastructure to extend this source to the service area. Therefore, Tables 23 indicates no direct uses of recycled water in the service area during the planning period.

Table 23

Recycled Water — Potential Future Use (afy)

User Type	Description	Feasibility	2015	2020	2025	2030	2035
Agricultural Irrigation		No	0	0	0	0	0
Landscape Irrigation		Not during planning period	0	0	0	0	0
Commercial Irrigation		Not during planning period	0	0	0	0	0
Golf Course Irrigation		No	0	0	0	0	0
Wildlife Habitat		No	0	0	0	0	0
Wetlands		No	0	0	0	0	0
Industrial Reuse		No	0	0	0	0	0
Groundwater Recharge		No	0	0	0	0	0
Indirect Potable Reuse	Groundwater Replenishment	Yes	438	620	620	620	620
Other (User Type)			0	0	0	0	0
Total			438	620	620	620	620

However, since the District pumps groundwater from the Basin which is replenished partially with recycled water and the service area contributes to recycled water supplies, MWDOC calculates the five year average amount of recycled water for indirect potable reuse associated with member agency pumping. The average indirect potable reuse for the previous five years for SWD was 43 afy but this only included two years of operation of the GWRS. As discussed above, the system has been expanded to replenish greater quantities and will be expanded again before 2015. As presented in Table 23, the five year average District utilization of indirect potable recycled water by 2015 will be 438 afy and 620 afy by 2020.

The GWRS is the largest managed indirect potable replenishment program using recycled water supplies in the world. The feasibility of expanding this project is very high because it has great quantities of wastewater flow available for recycling, recharge facilities available, public support, and concerns over rising imported water costs, as well as technical, institutional, and economic capabilities. Although direct use of recycled water is not being planned by the District, the District supports, encourages, and contributes to the continued development of recycled water, potential direct uses throughout the region, as well as District use of indirect potable supply from the OCSD/OCWD GWRS.

Table 24 presents a comparison of 2005 UWMP projections for recycled water to actual uses. This is the first UWMP prepared by the District; there were no 2005 projections for 2010 usage. The indirect potable reuse estimate for 2010 was estimated by MWDOC for the District.

Table 24
Recycled Water — 2005 UWMP Use Projection Compared to 2010 Actual

Use Type	2010 Actual Use	2005 Projection for 2010[1]
Agricultural Irrigation	0	0
Landscape Irrigation	0	0
Commercial Irrigation	0	0
Golf course Irrigation	0	0
Wildlife Habitat	0	0
Wetlands	0	0
Industrial Reuse	0	0
Groundwater Recharge	0	0
Indirect Potable Reuse[2]	97	0
Other (User Type)	0	0
Total	97	0

[1]This 2010 UWMP is SWD's first UWMP.
[2]IPR quantities provided by MWDOC, 2011.

4.6.4 Recycled Water Optimization

Until recycled water is made available to the District, the District does not have a plan to optimize the direct use of recycled water nor offer specific methods to encourage recycled water use, as indicated in Table 25. As a user of groundwater in the Basin, the District supports the efforts of OCWD and OCSD to utilize recycled water as a primary resource for groundwater recharge in Orange County. The District will continue to conduct cost benefit analyses when feasible for direct recycled water use projects.

Table 25						
Methods to Encourage Recycled Water Use						
	Projected Results (afy)					
Actions	2010	2015	2020	2025	2030	2035
None	0	0	0	0	0	0
Total	0	0	0	0	0	0

4.7 Future Water Projects

4.7.1 District Projects

Based on the current availability of groundwater, local surface water, and imported supplies to the District, no new water projects or supply programs are being considered for District implementation at this time, as presented in Table 26. The District is currently upgrading its water treatment plant to be able to respond to changing treatment requirements but it is not a new source of water supply. The District continually maintains and upgrades its distribution and storage system, but this is also not contributing a new source of supply. Other agency supply projects which directly benefit the District are summarized below.

Table 26								
Future SWD Water Supply Projects (afy)								
Project Name	Projected Start Date	Projected Comple-tion Date	Potential Project Constraints	Normal Year Supply	Single Dry Year Supply	Multiple Dry Year First Year Supply	Multiple Dry Year Second Year Supply	Multiple Dry Year Third Year Supply
The District is not implementing new supply projects at this time.								
		Total	0	0	0	0	0	0

4.7.2 Regional Agency Projects

Since small amounts of imported water are purchased by the District, projects implemented by MWD and MWDOC to secure their water supplies have a direct benefit to SWD. In addition, OCWD and OCSD's planned projects and programs for groundwater replenishment and recycled water can also benefit the District.

MWD's 2010 RUWMP discusses opportunities to enhance and maintain imported supplies in conjunction with its 2010 Integrated Water Resources Plan Update. The MWDOC 2010 RUWMP discusses a number of water supply opportunities in Orange County undertaken by

these regional agencies and MWDOC to protect and maximize the yield of the Basin and enhance supplies including transfers and exchanges, desalination, and further uses of recycled water.

MWD Projects

MWD's 2010 RUWMP discusses opportunities to enhance and maintain imported supplies in conjunction with its 2010 Integrated Water Resources Plan Update. According to MWD's 2010 RUWMP, it is continuing to diversity its supply resource mix to increase long term regional water supply reliability. These efforts have been focused on the following programs and actions.

- Pursue long term storage solutions for the Delta
- Develop storage programs related to the SWP and Colorado River
- Develop storage and groundwater management programs within Southern California
- Increase conservation
- Increase water recycling, groundwater recovery, and seawater desalination
- Develop water supply management programs outside of the region

Detailed descriptions of these and other projects are provided in MWD's 2010 RUWMP along with supply quantities anticipated under normal and dry year conditions.

MWDOC Projects

Desalination. In Orange County, there are three proposed ocean desalination projects that could serve MWDOC and its member agencies: Huntington Beach Seawater Desalination Project, South Orange Coastal Ocean Desalination Project (in Dana Point), and Camp Pendleton Seawater Desalination Project. These projects are discussed in MWDOC's 2010 Regional UWMP and are summarized here.

Poseidon Resources Corporation, a private company, is proposing the Huntington Beach Seawater Desalination Project. It is to be located adjacent to the AES Generation Power Plant in Huntington Beach on Pacific Coast Highway. This project would provide 50 mgd of water and is planned to be operational by 2015.

MWDOC is proposing an ocean water desalination project to be located in Dana Point adjacent to San Juan Creek. Five agencies: Laguna Beach County Water District, Moulton Niguel Water District, City of San Juan Capistrano, City of San Clemente Utilities Division, and South Coast Water District are participating in the study of a 25 mgd regional plant. This facility would produce a new water supply of 12,000 to 24,000 afy, which would not only improve system

reliability but would improve water quality by providing a lower level of total dissolved solids (TDS). A lower level TDS supply also benefits recycled water opportunities by improving the quality of the wastewater effluent being treated. MWDOC is studying the project location adjacent to San Juan Creek at Doheny State Beach. The project showed favorable enough results to pursue a pilot plant to further test the feasibility of a larger project using a subsurface intake system.

The project under development in Camp Pendleton, located adjacent to the Santa Margarita River, is being studied by the San Diego County Water Authority. This initial 50 or 100 mgd plant would be expandable in 50 mgd increments up to 150 mgd. The project is currently in the feasibility study stage with numerous studies being conducted. MWDOC and south Orange County agencies are maintaining a potential interest in the project but are limited currently to fact finding and monitoring of the project (MWDOC, 2011). In addition to desalination projects, MWDOC is supporting its member agencies in pursuing local projects or projects with value to its member agency.

Implementation of the Dana Point and Huntington Beach ocean water desalination projects can reduce groundwater pumping levels in coastal Orange County and assist in refilling the groundwater basin. Implementation of these desalination projects requires extensive regulatory, permitting, and environmental documentation requirements.

Recycled Water. OCSD in conjunction with OCWD developed and began operation of the GWRS in January 2008. This up to 70 mgd capacity project treats wastewater to drinking water standards to increase quantities being injected directly into the existing seawater intrusion barrier, and also to percolate in OCWD's two recharge basins along the Santa Ana River in Anaheim. The GWRS provides a new source of high quality water for year-round recharge. The project will be expanded before 2020 allowing increased quantities of recycled water to be recharged to the Basin.

4.8 Climate Change Impacts

Climate change and or greenhouse gas emissions are considered in city and county general plans, California Environmental Quality Act documents, and integrated regional water management plans (IRWMP). By considering potential water supply impacts resulting from climate changes in its UWMP, the District integrates this UWMP with these documents and supports water management functions. The District is a member of the IRWMP for the Santa Ana Watershed Project Authority; the Santa Ana Watershed Project Authority IRWMP document contains or will contain climate change objectives. Information on the vulnerability of its water supplies and service area water demands is provided here to aid the District in

preparing for and adapting to expected climate change impacts. Water conserved under the District's conservation efforts has a direct correlation with reduced GHGs as energy is required to move, treat, use, and discharge water.

4.8.1 Surface Supplies and Service Area Impacts

According to the Public Policy Institute of California,

> "…Air temperatures are projected to increase throughout the state over the coming century. Sea level is expected to rise 39 to 55 inches by 2100, and the frequency of extreme events such as heat waves, wildfires, floods, and droughts is expected to increase. Higher temperatures will result in more rain and less snow, diminishing the reserves of water held in the Sierra Nevada snowpack."(PPIC, 2011)

The following impacts to the District's imported supply are anticipated resulting in reduced SWP deliveries and supply outages. MWD is anticipating these impacts and is diversifying its supply portfolio and increasing groundwater banking to compensate for reduced SWP deliveries. Many of these impacts are also applicable to the District's surface water supply.

- An increase in average surface temperatures of 5.5 to 10.4 degrees Fahrenheit is anticipated by the end of the century, resulting in up to four times as many heat wave days in urban centers.
- Heat waves will increase in frequency, magnitude, and duration.
- Longer, drier, and more frequent periods of droughts anticipated with up to 2.5 times the number of critically dry years by the end of the century. Modest changes in precipitation can have a large impact on runoff. Lower inflows will make it more difficult to repel salinity in the Sacramento River - San Joaquin River Delta (Delta).
- About 25 to 40 percent of the Sierra snowpack may be lost by 2050. Higher temperatures increase the ratio of rain to snow, accelerate the rate of spring snowmelt, and shorten the overall snowfall season, leading to more rapid and earlier seasonal runoff.
- Over 55 percent increase in risk of large wildfires is anticipated. Fires result in changes in vegetation and eventually a reduction in water supply and storage capacity in the Sierras.
- More severe (e.g., frequency, intensity) and warmer winter storms are likely to occur, increasing runoff and flooding which could cause Delta levee failure.
- Increased tidal salinity intrusion to the Delta from sea level rise, lower inflows, and Delta levee failures. Without major changes to in-Delta facilities, more fresh water will be

needed to repel seawater and maintain water quality standards, especially during drier years.

- Degraded water quality of Delta supplies is anticipated due to changing temperatures, flows, runoff rates and timing, and the ability of watersheds to assimilate wastes and pollutants. Lower Delta inflows during certain times of the year will degrade water quality by increasing temperatures and minimizing the dilution effects of runoff and wastewater discharges. Warmer water can accelerate some biological and chemical processes, increasing growth of algae and microorganisms. Higher winter flows will increase contaminant loadings from nonpoint sources. Intense rainfall following wildfires can degrade water quality. (Santa Barbara, 2009)

Since winter snowpack in the Sierra Nevada functions as a major water storage system, this will have serious consequences to annual supply availability in all systems that rely on the runoff. These impacts to Statewide water supplies originating from the Delta watershed, as well as current flood control practices on Sierra Nevada reservoirs, will reduce MWD's supplies from the SWP. In addition, flooding in the Delta could have devastating impacts on the reliability of Delta exports with supply outages anticipated for up to one year.

Colorado River flows are anticipated to decrease by 5 to 20 percent in the next 40 years, according to Brad Udall, director of the University of Colorado Western Water Assessment. Earlier runoff and lower flows from the Rocky Mountains later in the year are also anticipated (Zeilinski, 2010).

4.8.2 Water Demands

Climate change is anticipated to impact water demands through more frequent and more intense heat waves and extended dry periods which will cause increases in demands in the District service area. This is evident in demand patterns associated with a first dry water year. It is not known yet if changes in precipitation patterns will offset these increases. DWR recommends for long term planning that local agencies assume a 20 percent increase in the frequency and duration of future dry conditions. On a positive note, it may be likely that with the changes to climate patterns, more monsoon conditions will occur in Southern California, resulting in precipitation in the summer, reducing outdoor landscaping demands.

4.8.3 Groundwater Supply

The District's groundwater supplies will have increased pressure, due to sea level rise, on the seawater barriers requiring more injection supply to prevent contamination of Orange County Basin groundwater supplies. OCWD's conjunctive use management of the Basin will take on even greater importance as increased quantities of surface water will likely be imported to

recharge the Basin as more frequent and more intense heat waves and extended dry periods deplete resources and increase demands for those resources. With the reduced Sierra snowpack, groundwater storage throughout the State will be more important as early thaws will require new storage facilities to be made available.

Because climate change is such a gradual process, it can be difficult to distinguish these changes from the usual variability in supplies and demands. However, MWD is increasing its water supply options to compensate for SWP and Colorado River reductions. The District will continue to adapt to changing conditions within its service area as well as maintain conservation efforts to reduce greenhouse gas emissions.

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Section 5 - Supply Reliability and Water Shortage Contingency Planning

During the previous five years, Southern Californians faced significant changes to their water supply. There has been an extended drought on the Colorado River and the need to develop a long term Delta solution. An extended dry period locally began in 2007. In December of 2008, a federal court decision restricted SWP pumping from the Delta. Because of the potential for water shortages, water allocations for MWDOC were imposed by MWD.

The District water supplies are vulnerable to seasonal or climatic shortages as well as catastrophic events. The District has been proactive in adopting a water shortage contingency plan to plan for the response to emergencies or other external events. This section summarizes the reliability of District water supplies, potential impacts to supplies due to water quality concerns, and District planning for droughts including water shortage contingency planning.

5.1 Water Supply Reliability

The District had the foresight to expand its portfolio of supplies to reduce its vulnerability to seasonal and climatic variability. The local surface water supply may be most vulnerable to shortages, but this supply is augmented with groundwater supplies. The District has worked hard to maximize its local resources to minimize imported water use. However, imported purchases remain an important supplemental source of supply. The District remains committed to maximizing the efficient use of existing local supplies and to managing all supplies available to it to ensure that adequate supplies will be available to meet future water demands.

Although the imported MWD supply is not used very often, it is an important supplemental supply for the District for use at times when the local surface water supply is limited by precipitation conditions. Most of the supply has historically come from the Colorado River although improvements were made to MWD's system to allow greater flexibility in conveying northern California supplies from the SWP to Lake Mathews. The imported water conveyed from the Delta has been curtailed in recent years due to drought conditions in the Feather River watershed and court ordered Delta pumping restrictions. As a result, MWD has aggressively pursued and obtained additional supplies to augment these two sources, and is continuing to acquire additional supplies.

5.1.1 Influencing Factors

Factors that could potentially influence the reliability of District supplies include legal, environmental, water quality, and climatic factors. Although climatic factors affect all water supplies, only climatic influences on the reliability of local surface waters will directly affect

District supply availability, as indicated in Table 27. Precipitation variations result in a relatively inconsistent supply on a year to year basis.

Table 27 (DWR Table 29)		
Factors Resulting in Inconsistency of Supply		
Water Supply Sources[1]	**Limitation Quantification**	**Information Regarding Legal, Environmental, Water Quality, or Climate Factors**
Irvine Lake Surface Water	Variable	**Climate**. Local runoff stored in Irvine Lake is obtained from runoff in Santiago Creek watershed which is dependent upon rainfall.
Orange County Groundwater Basin	None	Groundwater is relatively consistent in the Basin
Imported MWD Supply	None	**Environment and Climate.** MWD is diversifying its supply sources to minimize overall reliability impacts due to environmental and climatic factors affecting SWP and Colorado River sources.

[1] Supply sources from Table 16.

However, because the District has such a diverse portfolio of supplies, when one supply is limited, another supply may be used in greater quantities. For example, during dry years when local precipitation levels are low, groundwater pumping may be maximized by paying the additional Basin Equity Assessment. When additional supplies are needed, either the BPP is exceeded and the BEA paid, or what more frequently occurs, the District purchases imported MWD water. Purchasing imported water and storing it in Irvine Lake allows the District to maintain consistent WTP operations with its fixed costs. The only constraint on imported supplies and in exceeding the groundwater BPP is the cost. As previously discussed, MWD has an extensive supply augmentation program to assure its member agencies that imported supplies will be reliable through 3035.

5.1.2 Water Quality

In the past, the District's WTP had difficulty treating highly turbid water from Irvine Lake, however, these incidences were few and far between. For example, the WTP was shut down following the high precipitation event of January and February 2005 (nine inches and eight inches, respectively) but not due to the Santiago Fire of October 2007 followed by five inches of rainfall in January 2008. These rare turbidity events were due to high intensity precipitation events in the Santiago Creek watershed causing particles to remain suspended during aqueous transport to Irvine Lake. However, the cause of highly turbid water also resulted in greater levels of local surface water supply availability once the water settled in the reservoir. Improvements being made to the treatment process will allow for even fewer incidents of WTP shutdowns.

All groundwater and Irvine Lake water quality constituents were below primary drinking water maximum contaminant levels (MCLs) during the previous five year period ending in 2009. Quagga mussels were found in Irvine Lake starting in 2008, predominantly near the MWD inlet and the Irvine Lake outlet tower gates. Quagga mussels arrived from MWD's Lake Mathews, originating from the Colorado River Aqueduct. As required by California Department of Fish and Game, the District and IRWD developed a control plan for Irvine Lake in 2009. A diving inspection in August 2009 determined that the mussels present were typically older individuals; no new population of Veligers were found, indicating that the Districts' efforts have been somewhat effective (SWD, 2009).

Imported MWD supplies are delivered to Irvine Lake from Lake Mathews which has historically been primarily supplied by Colorado River water. According to the 2009 Irvine Lake watershed sanitary survey, a comparison of average values for Irvine Lake water and Lake Mathews water indicates that the waters are very similar in composition. Bromide is somewhat lower in Irvine Lake and alkalinity and hardness is somewhat higher in Irvine Lake water. More information on water quality of the surface supplies can be found in the "Irvine Lake and Villa Park Dam 2009 Watershed Sanitary Survey" prepared by the District and IRWD in 2009. As presented in Table 28, no water quality impacts are anticipated with the local surface water, Basin groundwater, or imported water.

Table 28 (DWR Table 30)

Water Quality — Current and Projected Water Supply Impacts (acre-feet)

Water Source	Description of Condition	2010	2015	2020	2025	2030	2035
Irvine Lake Surface Water	WTP shutdown during very high turbidity events	0	0	0	0	0	0
Orange County Groundwater Basin	None	0	0	0	0	0	0
Imported MWD Supply	None	0	0	0	0	0	0

5.2 Drought Planning

Climatological data in California has been recorded since the year 1858. During the twentieth century, California experienced three periods of severe drought: 1928-34, 1976-77 and 1987-92. The year 1977 is considered to be the driest year of record in the Four Rivers Basin by DWR. These rivers flow into the Delta and are the source waters for the SWP, thus MWD's selection as the single driest base year. However, Southern California and, in particular Orange County, sustained few adverse impacts from the 1976-77 drought, due in large part to the availability of

Colorado River water and groundwater stored in the Basin. The 1987 to 1992, 2000 to 2003, and 2007 to 2009 droughts had a greater impact on Southern California and Orange County.

5.2.1 Basis of Water Years

To analyze the variability of reliability due to climate, hydrologic conditions that define various year types were determined. The years identified in Table 29 reflect these year types: average, single dry year, and multiple dry years. The year types are defined below.

Table 29 (DWR Table 27)

Basis of Water Year Data

Water Year Type	Supply Source	Base Years[1]
Average/Normal Water Year	Local Surface and Groundwater	2006 (based on 1999-2009)
	Imported MWD	1922 to 2004
Single Dry Water Year	Local Surface and Groundwater	2007
	Imported MWD	1977
Multiple Dry Water Years	Local Surface and Groundwater	2001 to 2003
	Imported MWD	1990 to 1992

[1] MWD base years from 2010 RUWMP. Local base years from SWD Santiago Creek flow data. 2006 local supplies best match production during the average year Santiago Creek flows.

Normal/Average Year: The normal year most closely represents median runoff levels and patterns. The supply quantities for this condition are derived from historical average yields. There are three different supply sources and relatively stable water demands. The median runoff for the Santiago Creek watershed over the previous ten years was in 2006. 2006 District water production also most closely represented average demands over the 10 year period. MWD used 1922 through 2004 to establish this normal year for its imported supplies.

Single Dry Year: This is defined as the year with the minimum useable supply. A single dry year is generally considered to be the lowest annual runoff for a watershed (DWR, 2010). At Irvine Lake, 2007 was the single driest year at 5.57 inches of precipitation compared with an average of 14 inches. Not surprisingly, inflow to the reservoir from Santiago Creek was at its lowest during 2007. The year 2007 was used for the single dry base year. MWD identified 1977 as the single driest year since 1922 for its imported supplies.

Multiple Dry Years: This is defined as three consecutive years with the minimum useable yield or supply. Water systems are more vulnerable to these droughts of long duration, because they deplete water storage reserves in local and state reservoirs and groundwater basins. 2001 through 2003 were used as base years for multiple dry years to reflect two consecutive very

low inflow years leaving limited availability of local surface waters for three consecutive years. The low inflows to the reservoir and limited availability of stored water represents the worst case multiple dry year scenario. MWD identified 1990 to 1993 as the driest multiple years since 1922 when the least amount of imported water was available.

The local groundwater supplies are managed by OCWD and the BPP could change every year depending on numerous factors including Basin storage and Santa Ana River water capture, which are influenced by climatic conditions. During past single dry year and multiple dry year events, groundwater supplies were available in this non-adjudicated Basin, but at a higher price (BEA) when the District's BPP is exceeded. However, to be conservative, it was assumed the District would pump to the current 62 percent BPP.

Although the District uses the imported MWD supply it obtains through MWDOC as a supplemental supply, it is critically important during local dry years. MWD has extensive programs and plans to increase supply reliability which are addressed in its 2010 RUWMP. MWD has determined in its 2010 RUWMP that the region can provide reliable water supplies under both the single driest year and the multiple dry year hydrologies, with a surplus of supply for all dry year scenarios through 2035. MWDOC has confirmed this assumption of fully reliable supplies during all year types (MWDOC, 2011)

Table 30 summarizes supply availability for the local base years. Totals include purchased imported supply of the maximum annual historical purchase since this supply will be more readily available during the local base dry years. Groundwater availability was based on 62 percent BPP, although availability could be higher. Local surface water accounted for within the totals was based on actual local surface water yield during these base years.

Table 30 (DWR Table 28)

Supply Reliability — Historical Conditions (afy)

	Average/ Normal Water Year (2006)	Single Dry Water Year (2007)	Multiple Dry Water Years		
			Year 1 (2001)	Year 2 (2002)	Year 3 (2003)
Availability[1]	7,842	6,497	7,172	6,850	6,557
Percent of Average/Normal Year[2]	100%	83%	91%	87%	84%

[1]Supply data reflects supplies available for each of the local base years in Table 29.
[2]Percent of the dry year supply compared with the average or normal year supply availability.

The available supplies and demands for the District were analyzed to assess the ability to meet demands during the three different base water year scenarios identified in Table 30. Table 31

presents the quantities of supply available to the District under normal or average years from Table 30 and an estimate of supply availability for the next three years (2011 through 2013) under the multiple dry year base conditions. The three year estimate is based on the base years use of the Irvine Lake supply during 2001 through 2003 averaged; the BPP of 62 percent of demands for the groundwater supply; and the maximum purchase of imported water.

While the data shown in Table 31 identify water availability during a multiple dry year scenario, response to an actual drought would follow the water use efficiency mandates of MWD's Water Surplus and Drought Management Plan (WSDM Plan), along with implementation of the appropriate stage of the District's Water Conservation & Water Supply Shortage Program discussed later in this section. Details of the WSDM Plan can be found in Appendix A.4 of MWD's 2010 RUWMP. The District's shortage contingency program is provided in Appendix F.

The District's water supply and demand conditions during each of the water year types for the next twenty five years is discussed below.

Table 31

Supply Reliability — Current Water Sources (acre-feet)

Water Supply Sources	Average / Normal Water Year Supply[1]	Multiple Dry Water Year Supply		
		Year 2011	Year 2012	Year 2013
Irvine Lake Surface Water[2]	2,750	1,604	1,604	1,604
Orange County Groundwater Basin[3]	2,254	1,936	1,937	1,938
Imported MWD Supply[1]	2,838	2,838	2,838	2,838
Total	7,842	6,378	6,379	6,379
Percent of Normal Year:	100%	81%	81%	81%

[1]Supply availability from Table 30 except groundwater which is based on BPP applied to 2011 through 2013 demands.
[2] Local surface availability under multiple dry years was averaged over the three year period.
[3]Groundwater based on 62 percent BPP.

5.2.2 District Capabilities: Normal Year

Average water year availability is compared to projected water demands through 2035 in Table 32. The average year supplies summarized in Table 31 indicate that supplies will be available to meet District demands during a normal water year. As discussed in Section 2, the District has limited development potential for low density residential development resulting in very little increase to demands, offset by anticipated conservation savings. Even without the 20 percent reduction in demands associated with additional conservation savings and use of recycled water, demands can be met with existing supplies.

Table 32					
Supply and Demand Comparison — Normal Year (acre-feet)					
	2015	**2020**	**2025**	**2030**	**2035**
Supply Totals (From Table 16)	7,743	7,747	7,762	7,783	7,799
Demand Totals (From Table 14)[1]	4,524	4,164	4,185	4,214	4,235
Difference	3,219	3,582	3,577	3,569	3,564
Difference as % of Supply	42%	46%	46%	46%	46%
Difference as % of Demand	71%	86%	85%	85%	84%

[1]Includes sales to Orange.

5.2.3 District Capabilities: Single Dry Year

Supplies and demands for the District service area were analyzed to determine impacts associated with a single dry year. The projected single dry year supply is based on the availability of water for each source. A 6.6 percent "bump" in the combined Total Water Deliveries and Additional Water Uses and Losses from Table 14 were incorporated to reflect a typical increase in demands associated with the first year of drier weather, before additional conservation programs are implemented. Sales to Orange were not increased. Table 33 presents a comparison of projected single dry year water supply availability to the bumped single dry year water demands projected for the next 25 years. This table indicates that the region can provide reliable water supplies under the single driest year hydrology.

Table 33					
Supply and Demand Comparison — Single Dry Year (acre-feet)					
	2015	**2020**	**2025**	**2030**	**2035**
Supply Totals (From Table 30)	6,497	6,497	6,497	6,497	6,497
Demand Totals (with Bump)[1]	4,741	4,357	4,379	4,410	4,433
Difference	1,756	2,140	2,118	2,087	2,064
Difference as % of Supply	27%	33%	33%	32%	32%
Difference as % of Demand	37%	49%	48%	47%	47%

[1] Single dry year SWD and unaccounted for demands (not sales to Orange) were increased by 6.6 percent to reflect drier weather conditions causing an increase in demands. "Bump" percent provided by MWDOC, 2010. Flat sales to Orange (1,240 afy) assumed.

5.2.4 District Capabilities: Multiple Dry Years

Projected supplies for a multiple dry year scenario reflect supply availability during the base period of 2001 through 2003. An average of the three dry years was used instead of year-by-year differences because local surface water availability is dependent on stored amount entering the drought and balancing available supplies during the drought or emergency.

Water demands were also analyzed for this multiple dry year scenario. The Total Water Deliveries and Additional Water Uses and Losses demands from Table 14 were increased to reflect a single dry year bump of 6.6 percent associated with the first year of drier weather, before additional conservation programs are implemented. Sales to Orange were not increased. Typically, after the first dry year in which demands increase, demands then decline below average year demands due to raised consumer awareness of a dry period occurring. The third dry year can then range from an increase or a decrease over the second year. However, MWDOC is using a more conservative demand estimate for its RUWMP analysis: it applied the single dry year increase in demands to the multiple dry year scenario demands. This very conservative increase in demands for the second and third dry years was included here.

Table 34 presents a comparison of projected multiple dry year water supply availability to the multiple dry year water demands bumped up for each of the three years over the next 25 years. This table indicates that the region can provide reliable water supplies under the multiple dry year hydrology.

5.3 Water Shortage Contingency Planning

Actions that will be taken by the District in the event of a catastrophic reduction in water supplies are presented here. Events may include a regional power outage; an earthquake in the Delta affecting imported water supplies; an earthquake in the region affecting the District service area and local ground and surface water supplies; flooding, wildfire, or a chemical spill in the Santiago Creek watershed, and other disasters.

5.3.1 Stages of Action

In addition to permanent year-round actions to reduce water consumption, the District's three stage rationing plan is invoked during declared water shortages. The plan, which can be found in Appendix F, includes voluntary and mandatory rationing, depending on the causes, severity, and anticipated duration of the supply shortage.

As presented in Table 35, the stages consist of the following.

- Permanent Stage
- Moderate Shortage Stage
- High Shortage Stage
- Emergency Shortage Stage

Table 34						
Supply and Demand Comparison — Multiple Dry Year Events (acre-feet)						
		2015	**2020**	**2025**	**2030**	**2035**
Multiple Dry Year First Year Supply	**Supply Totals**[1]	7,172	7,172	7,172	7,172	7,172
	Demand Totals[2]	4,741	4,357	4,379	4,410	4,433
	Difference	2,431	2,815	2,793	2,762	2,739
	Difference as % of Supply	34%	39%	39%	39%	38%
	Difference as % of Demand	51%	65%	64%	63%	62%
Multiple Dry Year Second Year Supply	**Supply Totals**[1]	6,850	6,850	6,850	6,850	6,850
	Demand Totals[2]	4,741	4,357	4,379	4,410	4,433
	Difference	2,109	2,493	2,471	2,440	2,417
	Difference as % of Supply	31%	36%	36%	36%	35%
	Difference as % of Demand	44%	57%	56%	55%	55%
Multiple Dry Year Third Year Supply	**Supply Totals**[1]	6,557	6,557	6,557	6,557	6,557
	Demand Totals[2]	4,741	4,357	4,379	4,410	4,433
	Difference	1,816	2,200	2,178	2,147	2,124
	Difference as % of Supply	28%	34%	33%	33%	32%
	Difference as % of Demand	38%	50%	50%	49%	48%

[1] Supplies from Table 30.

[2] For a conservative analysis, dry year demands were increased by 6.6 percent all three years instead of just the first year. "Bump" 6.6 percent calculated and provided by MWDOC, 2010.

Table 35		
Water Shortage Contingency — Rationing Stages to Address Water Supply Shortages		
Stage Number	**Water Supply Conditions**	**% Shortage**
Permanent	Year Round	0
Level 1 (Moderate Shortage)	Shortage or threat of supply shortage	Not based on % shortage due to its varied supply portfolio
Level 2 (High Shortage)	Shortage or threat of supply shortage	Not based on % shortage due to its varied supply portfolio
Level 3 - Emergency	Shortage or threat of supply shortage	Not based on % shortage due to its varied supply portfolio but could result in savings of 50 percent to meet 50 percent shortage

A water supply shortage or threat of shortage exists when the District determines, in its sole discretion that it exists, due to drought, catastrophe, or other water supply condition. The District Board of Directors will declare the shortage by resolution. Advancement to the next level of shortage is also determined by the District as conditions warrant and declared by resolution. Different specific actions are taken at each stage.

5.3.2 Mandatory Prohibitions

Table 36 lists the mandatory prohibitions against specific water use practices during water shortage Levels 1 and 2. The year round permanent restrictions are discussed in Section 6. Information pertaining to specific prohibitions and reduction methods for each of the stages can be found in the District's Water Conservation & Water Supply Shortage Program provided in Appendix F.

Table 36

Water Shortage Contingency — Mandatory Prohibitions

Examples of Prohibitions	Stage When
Watering limited to three days a week April through October and one day per week November through March, with minor exceptions	Level 1
Fix leaks, breaks, and malfunctions within 72 hours	Level 1
Watering limited to two days a week April through October and one day per week November through March, with minor exceptions	Level 2
Fix leaks, breaks, and malfunctions within 48 hours	Level 2
No filling or refilling ornamental lakes or ponds	Level 2
Wash vehicles only at car wash with recirculating system, with minor exceptions	Level 2
No filling new residential pools or outdoor spas	Level 2

5.3.3 Consumption Reduction Methods

Consumption reduction methods to be used to reduce water use in the most restrictive stage of Level 3 are listed in Table 37. It is anticipated that total demands will be reduced by approximately 75 percent under the Level 3 watering restrictions alone in order to meet potential supply reductions of 50 percent. Because 95 percent of the District customers are single family residential with the majority of water demands associated with outdoor landscaping, reducing irrigation requirements will be difficult and expensive (e.g., replacing dead landscaping after the shortage) for homeowners, but would achieve the desired water savings required. Fixing leaks quickly will increase the amount saved.

Table 37		
Water Shortage Contingency — Consumption Reduction Methods		
Reduction Method	**Stage When**	**Projected Reduction (% or afy)**
Permanent, Level 1, and Level 2 restrictions	Level 3	Not quantified
No watering or irrigating with certain exceptions	Level 3	50 to 75 percent
Fix leaks within 24 hours	Level 3	Not quantified
No new potable water service	Level 3	Not quantified
Discontinue service if willful violations	Level 3	Not quantified
No new annexations to service areas	Level 3	Not quantified
	Total	50 to 75 percent

5.3.4 Penalties and Charges for Excessive Use

Any violation of the District's Water Conservation & Water Supply Shortage Program, including waste of water and excessive use, is a misdemeanor. In addition to any other remedies that the District may have for enforcement, service of water would be discontinued or appropriately limited to any customer who willfully uses water in violation of any provision of the plan. Table 38 lists the penalties for violation of any prohibitions.

Table 38	
Water Shortage Contingency — Penalties and Charges	
Penalties or Charges	**Stage When Penalty Takes Effect**
Written warning	First violation
Fine not to exceed $100	Second violation
Fine not to exceed $250	Third violation
Fine not to exceed $500; water flow restrictor to 1 gallon per minute	Fourth and subsequent violations
In addition to fines and flow restrictor, discontinue service if willful violations of mandatory restrictions	Any violation of prohibitions
Misdemeanor: imprisonment in county jail or fine or both	Any violation of prohibitions

5.3.5 Imported Water Shortage Program

As done in the recent past, the District follows the Water Supply Allocation Plan (WSAP) guidelines of MWD once an extreme shortage is declared. This allocation plan is enforced by MWD using rate surcharges. MWDOC follows the guidelines of the allocation plan and imposes the surcharge that MWD applies to its member agencies that exceed their water allocation. This results in higher costs to the District if its purchases exceed its allocation.

5.3.6 Revenue and Expenditure Impacts

During a catastrophic interruption of water supplies or prolonged drought or water shortage of any kind, expenditures may increase as damage to the water system requires emergency repairs or if additional imported water must be purchased at a higher rate or if the pumping BPP is exceeded. Expenditures may also go down, depending on the supply being impacted, as less water is pumped so power costs are lower, water treatment chemicals and operational costs are reduced because less surface water is treated at the WTP, or water purchase expenses are lower as imported water purchases are unavailable during a catastrophic event. However, the District will experience a reduction in revenue due to reduced water sales.

The District receives water revenue from a service charge for the first five units followed by a consumption (commodity) charge for each unit of consumption greater than five units. The rates have been designed to recover the full cost of water service in the service and commodity charges. Therefore, the total cost of purchasing water and producing local supplies would decrease as the usage or sale of water decreases, however there are significant fixed costs associated with maintaining a minimal level of service. Should an extreme shortage be declared and a large reduction in water sales occur for an extended period of time, the District would monitor projected revenues and expenditures.

To overcome these potential revenue losses and/or expenditure impacts, the District may utilize reserves to overcome revenue losses. If necessary, the District will reduce expenditures including delaying capital projects and equipment purchases, and as a last resort adjust the work force, implement a drought surcharge, and/or reexamine its water rate structure.

5.3.7 Mechanisms to Determine Actual Reductions

The District will implement its Water Supply Shortage Program which imposes prohibitions, regulations of water use, and penalties for violations of water use during times of severe water shortages. Water production figures are recorded daily by District staff; weekly and monthly reports are prepared and monitored. These data are available to be used to measure actual water savings resulting from the effectiveness of any water shortage contingency stage that may be implemented.

As stages of water shortage are declared by MWDOC, the District will follow implementation of those stages and continue to monitor water demand levels. It is not until MWD's Shortage Stage 5 that MWD may call for extraordinary conservation. During this stage, MWD's Drought Program Officer will coordinate public information activities with MWDOC and monitor the effectiveness of ongoing conservation programs. Monthly reporting on estimated water usage will be provided to MWDOC. The District will participate in member agency meetings with both MWDOC and OCWD to monitor and discuss water allocations. This will enable the District to be

aware of imported and groundwater use on a timely basis as a result of specific actions taken in response to MWD's Water Shortage Contingency Plan.

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Section 6 - Demand Management Measures

6.1 Background

The District is committed to conservation as a means to maintain its reliable supply sources for its service area. The District plans to continue implementation of its conservation programs in conjunction with MWDOC. As a member agency of MWDOC, the District benefits from various regional programs performed by MWDOC on behalf of its member agencies.

MWDOC became a signatory to the Best Management Practices (BMP) Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) in 1991. MWDOC has made the State-mandated Demand Management Measures (DMMs) monitored by the California Urban Water Conservation Council (CUWCC) the cornerstone of its conservation programs for its member agencies.

AB 1420 conditions the eligibility for a water management grant or loan on implementing or scheduling for implementation the DMMs listed in Water Code section 10631(f), or in demonstrating that certain BMPs are not locally cost effective. These DMMs correspond to the 14 BMPs listed and described in the CUWCC MOU. Based on this, DWR had determined that it will equate the DMMs with the BMPs for loan and grant funding eligibility purposes. Compliance on a regional basis required participation in a regional conservation program, such as MWDOC's, that achieves the level of conservation equivalent to the amount of savings achieved if each of the participating urban water suppliers implemented the DMMs.

Retail water agencies throughout Orange County recognize the need to use existing water supplies efficiently – implementation of BMP-based efficiency programs makes good economic sense and reflects responsible stewardship of the region's water resources. All retail water agencies in Orange County are actively implementing BMP-based programs; however, not all retail water agencies are signatory to the MOU. Although the District is not a signatory to the MOU, it continues to work cooperatively with MWDOC and MWD in implementing the 14 DMMs throughout the county. Most of the cost of implementing these programs is incorporated in MWDOC's rate surcharges.

The District's and MWDOC's commitment to implement BMP-based water use efficiency program continues today. Table 39 presents the implementation responsibility between MWDOC as the wholesaler and as the regional program manager, and the District for each of the DMMs. To help facilitate implementation of BMPs throughout Orange County, MWDOC's efforts focus on the following three areas that both comply with and go beyond the basic DMM J - Wholesaler Assistance requirements.

- Regional Program Implementation. MWDOC develops, obtains funding for, and implements regional BMP programs on behalf of all retail water agencies in Orange County. This approach minimizes confusion to consumers by providing, county-wide, the same programs with the same participation guidelines, and also maintains a consistent message to the public to use water efficiently. Regional programs implemented by MWDOC on behalf of the region are identified in Table 39. Outside funding for water use efficiency projects and programs has been obtained from MWD, U.S. Bureau of Reclamation (USBR), State Water Resources Control Board (SWRCB), and other state and federal sources.

Table 39

Implementation Responsibility and Regional Programs

Item[1]	Efficiency Measure	Applies to:		MWDOC Regional Program
		Retailer	MWDOC as a Wholesaler	
A	Water Survey Programs for Single Family and Multi-family Residential Customers	✓		✓
B	Residential Plumbing Fixture Retrofits	**75% saturation goal achieved in 2001**		
C	System Water Audits, Leak Detection and Repair	✓		✓
D	Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections	✓		✓
E	Large Landscape Conservation Programs and Incentives	✓		✓
F	High-Efficiency Washing Machine Rebates	✓		✓
G	Public Information Programs	✓	✓	✓
H	School Education Programs	✓	✓	✓
I	Commercial, Industrial, and Institutional Programs	✓		✓
J	Wholesale Agency Assistance Programs	✓	✓	✓
K	Conservation Pricing	✓	✓	✓
L	Water Conservation Coordinator	✓	✓	✓
M	Water Waste Prohibition	✓		✓
N	Residential ULFT Replacement Programs/Water-Sense Specification Toilets	✓		✓

[1] Per UWMP Act 10631(f)(1) and (2)

- Local Program Assistance. When requested, MWDOC assists retail agencies to develop and implement local programs within their individual service areas. This assistance includes collaboration with each retail agency to design a program to fit that agency's local needs, which may include providing staffing, targeting customer classes, acquiring grant funding from a variety of sources, and implementing, marketing, reporting, and evaluating the program. MWDOC provides assistance with a variety of local programs including, but not limited to, home water surveys, large landscape programs,

conservation public information, school education, conservation pricing, and water waste prohibitions.

- Research and Evaluation. An integral component of any water use efficiency program is the research and evaluation of potential and existing programs. Research allows an agency to measure the water savings benefits of a specific program and then compare those benefits to the costs of implementing the program in order to evaluate the economic feasibility of the program when compared to other efficiency projects or existing or potential sources of supply.

6.2 Demand Management Measures

The MOU outlines 14 DMMs for urban water conservation. The urban water conservation practices are intended to reduce long-term urban demands from what they would have been without implementation of these practices, and are in addition to programs that may be instituted during occasional water supply shortages. The District and the Water Use Efficiency Department at MWDOC take pride in providing programs to assist customers in reducing the amount of water used.

Programs administered by MWDOC's Water Use Efficiency Department to assist in promoting regional water use efficiency, as well as the District's DMM activities are presented here. Table 40 lists District's activities and MWDOC's regional water use efficiency DMM programs underway or scheduled for implementation within the next five years. The DMMs are either implemented directly by the District or as a part of MWDOC's regional program. A description of each is presented following the summary table.

Table 40			
SWD Demand Management Measure Status			
Item[1]	**Demand Management Measure**	**DMM Status [2]**	
		Implemented or Scheduled for Implementation	**Not Implemented or Scheduled for Implementation**
A	Water Survey Programs for Single Family and Multi-family Residential Customers	✓	
B	Residential Plumbing Fixture Retrofits	✓	
C	System Water Audits, Leak Detection and Repair	✓	
D	Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections	✓	
E	Large Landscape Conservation Programs and Incentives	✓	
F	High-Efficiency Washing Machine Rebates	✓	
G	Public Information Programs	✓	
H	School Education Programs	✓	
I	Commercial, Industrial, and Institutional Programs		✓
J	Wholesale Agency Assistance Programs	✓	
K	Conservation Pricing	✓	
L	Water Conservation Coordinator	✓	
M	Water Waste Prohibition	✓	
N	Residential ULFT Replacement Programs/Water-Sense Specification Toilets	✓	

[1] Per UWMP Act 10631(f)(1) and (2)
[2] Implemented by either SWD or MWDOC.

DMM A – Residential Water Survey Programs

MWDOC assists its retail water agencies to implement the Water Survey Programs for Single Family Residential and Multi-Family Residential Customers by making available the following programs aimed at increasing landscape water use efficiency for residential customers.

Smart Timer Rebate Program. In FY 2004/05, MWDOC launched its program aimed at providing a rebate incentive for the purchase and installation of 'weather based irrigation controller' or 'Smart Timers'. Under this regional program, residential and small commercial properties are eligible for a rebate when they purchase and install a weather-based irrigation controller, which has the potential to save 41 gallons per day per residence and can reduce runoff and pollution by 49 percent. While the commercial rebate MWDOC provides has been adjusted over time, the residential rebate has remained steady at $60 per active valve.

Commercial rebates evolved from $630 per irrigated area in the beginning to $25 per station currently. Because it was a new landscape water management device, MWDOC included in its program a device installation verification step. Post installation verification is provided along with any necessary smart timer scheduling corrections. The site's irrigation system is also evaluated, providing important educational advice on what needs to be improved.

The rebate program was funded by a grant from the SWRCB. Besides the SWRCB, additional funding partners include DWR, USBR, Natural Resource Conservation Service, MWD, and the local retail water agencies of Orange County. Because of the funding, MWDOC has been able to provide incentives for the installation of just under 2,400 residential smart timers and over 3,400 commercial smart timers throughout the county. The District has installed 12 residential smart timers resulting in a cumulative savings of just over one acre-foot.

Rotating Nozzle Rebate Program. This rebate program is offered to both residential and commercial customers. Through this program, site owners purchase and install rotary nozzles in existing irrigation systems. The rebate covers the cost of the devices and installation. The rebates will not exceed either of these two expenses. Following the submittal of a rebate application, water bill, and original purchase receipt, MWDOC directs the contractor to perform installation verifications of the sites that installed devices. Verifications include both residential and commercial properties. As a final step in the program, a qualitative and quantitative evaluation will be conducted on the rotary nozzles installed within the three-year program time line where there is sufficient time to gather consumption data for a 12-month post-installation period. Since the program start date in 2007, overall water savings to date are over 2,500 acre-feet of water throughout the county. There have been a total of 146,855 nozzle installed in the MWDOC service area. The Program has been extended through December of 2012 with a grant funding amount of $831,300. There have been a total of 1,723 rotating nozzles installed within the District service area resulting in a savings of 14.2 acre-feet.

Turf Removal Program. This program is a partnership between MWDOC, MWD, and local retail water agency. Through this program, residential and small commercial customers of participating retail water agencies are eligible to receive a minimum of $1 per square foot of turf removed for qualifying projects. The estimated project funding for residential sites is $76,600 while commercial site funding is estimated at $178,700. The goals of this program are to increase water use efficiency within Orange County, reduce runoff leaving the properties, and evaluate the effectiveness of water-saving practices.

Customers complete the program application and return it to MWDOC for review and to determine whether the site will be approved or denied. Once the application is approved, customers are contacted to schedule the mandatory pre-inspection. Once the customer's pre-

inspection is complete, the results are forwarded to program staff. If the site qualifies, a follow-up letter and authorization to proceed will be mailed/emailed out within a few days. Upon receipt of this authorization to proceed, the customer may begin the turf removal project. The customer has 60 days to complete the work. Once all work is complete, the customer contacts the Program Administrator to indicate that the work is completed and to schedule the mandatory post-inspection. After the final, mandatory site visit and verification of the amount of turf removed, the rebate check is issued. All work performed in association with this Program must be completed by March 31, 2011. The District has had 8,492 square feet of synthetic turf installed with a cumulative savings of 4.6 acre-feet.

California Friendly Landscape Training (Residential). The California Friendly Landscape Training provides education to residential homeowners and professional landscape contractors on a variety of landscape water efficiency practices. These classes are hosted by MWDOC and/or the retail agencies to encourage participation across the county. The residential training program consists of either a half-day mini class or individual, topic-specific, four-hour classes. The topics presented include the following.

- Basic Landscape Design
- California Friendly Plants
- Efficiency Irrigation Systems
- Soils, Watering, Fertilizing

Approximately 1,040 people have participated in the residential California Friendly Landscape Training Program throughout Orange County since 2005, with no numbers identified specifically for the District.

DMM B - Residential Plumbing Retrofits

Using the 2001 *Orange County Saturation Study* as a benchmark, saturation of low-flow showerheads was measured by MWDOC at 67 percent and 60 percent in single and multi-family housing stock respectively. Today, low-flow showerhead saturation is estimated at nearly 100 percent and 94 percent saturation in single and multi-family homes, respectively. As a result, water agencies throughout Orange County have achieved the 75 percent saturation requirement for this BMP. No further low-flow showerhead distribution or installation activity has occurred.

DMM C - System Water Audits, Leak Detection and Repair

The District maintains an emergency response program that aggressively repairs main breaks, hydrant leaks or breaks, and meter leaks. A team is available to permanently repair breaks and

promptly restore water service. All meter leaks are investigated and repaired the same day unless unable to do so, then next day service is performed.

To assist its retail agencies, MWDOC publishes annually the *Orange County Water Agencies Water Rates, Water System Operations, and Financial Information* survey. This survey facilitates a pre-screening survey that estimates the volume and percent of unaccounted-for water for each retail water agency in the county. In 2004, the percent of unaccounted-for water for Orange County retail water agencies ranged from a low of 1.2 percent to a high of 10.7 percent, with an average of 5.1 percent. District data indicate that the unaccounted for water estimate is 5.0 percent for its distribution system based on the previous five years, reflecting a very efficient system. The District's 2006 distribution system master plan includes improvements to help reduce unaccounted for water loss.

DMM D - Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections

Metering with commodity rates by wholesale and retail agencies has been an industry standard throughout Orange County for many years. All customers are metered and billed bi-monthly based on commodity rates. The District requires meters for all customers and bills by volume of use. It recently updated its water rate structure to include a fixed charge for the first five units of water with usage above that amount billed per unit. All water service connections, with the exception of dedicated fire services, are metered. The District will continue to require metering for all connections.

DMM E - Large Landscape Conservation Programs and Incentives

MWDOC offers landscape water use efficiency programs aimed at both residential and commercial customers, as described under DMM A. MWDOC also offers programs in Orange County to specifically assist retail agencies and their large landscape customers to use water efficiently through a landscape performance certification program, and California Friendly Landscape Training for professionals. Although the District supports MWDOC's efforts with these programs, only the California Friendly Landscape Training for professionals is applicable to the service area. MWDOC's unique and innovative landscape performance certification program is primarily targeted for homeowner associations, of which there are a limited number within the service area.

The California Friendly Landscape Training for professionals educates professional landscape contractors on a variety of landscape water efficiency practices they can employ. The professional training program course consists of four consecutive classes in landscape water management, each building upon principles presented in the preceding class. Each participant

receives a bound handbook containing educational materials for each class. These classes are offered throughout the year and are taught in both English and Spanish. The following is a synopsis of each class in the course.

- **Irrigation Principles:** Topics include irrigation system types, sprinkler layouts, sprinkler components, sprinkler selection and spacing, and common sprinkler problems.

- **Irrigation System Troubleshooting:** This session focuses on an analytical approach to solving irrigation system failures. Three potential problem areas are examined: (1) mechanical problems, 2) hydraulic problems, and 3) electrical problems. Workshop participants receive practical training in the use of electrical troubleshooting equipment.

- **Controller Programming:** A hands-on workshop where participants learn basic controller features by programming sample cases. Participants then move into advanced controller features as they input more complex schedules, taking into consideration temperature/seasonal changes, rain, landscape activities, and demands that limit irrigation times. Irrigation controllers are provided for in-class use.

- **Irrigation Scheduling:** This session focuses on two critical questions: 1) When to irrigate, and 2) How much water to apply. A variety of field techniques and methods are presented, along with the technical aspects to be considered when scheduling irrigation run times. Each class participant is furnished with the tools needed to perform an irrigation scheduling assignment.

Upon completion of the course, participants receive a certificate listing all classes completed. Participants are eligible for continuing education credits as certified by the Irrigation Association. There were 362 commercial participants in MWDOC's program since 2005. It is not possible to determine how many of these professionals work on landscapes within the District service area.

DMM F – High Efficiency Washing Machine Rebates

The District participates in the SoCal Water$mart residential rebate program offered by MWD. This program offers financial incentives to single family and multi-family residential customers through the form of a rebate. Orange County residents are eligible to receive an $85 rebate when they purchase a new high efficiency clothes washer (HECW). This program began in 2001 and is sponsored by MWDOC, MWD, and local retail water agencies. Rebates are available on a first-come, first-served basis, while funds last. Participants must be willing to allow an inspection of the installed machine for verification of program compliance. Machines must

have a water factor of 4.0 or less. Depending on use, these machines can save 10,000 gallons of water per year.

As of 2010, more than 62,555 HECWs have been installed in single and multi-family homes in Orange County through this program. These retrofits have saved over 7,700 acre-feet over the program's lifetime. The District participation has been 259 machines installed since 2001 with a cumulative savings of 32.7 acre-feet.

DMM G - Public Information Program

The District and MWDOC partner on public information education and outreach programs. MWDOC's public information programs reach thousands of consumers annually. MWDOC's water use efficiency public information programs are built around communication, coordination and partnerships with its member agencies and cities, MWD, and other local, state, and federal legislative and regulatory bodies. The goal is to help member agencies and the public understand current issues and the challenges, opportunities, and costs involved in securing a reliable supply of high quality water.

Through a variety of public information programs, MWDOC assists its member agencies in reaching the public with accurate, consistent information regarding present and future water supplies and the importance of implementing water efficient techniques and behaviors. MWDOC also assists its member agencies in publicizing the availability of water use efficiency programs and technologies throughout Orange County. MWDOC launched its "Water: Do More with Less" outreach effort partnering with leading organizations and businesses to facilitate water efficient behaviors and attitudes. MWDOC conducts the following activities on behalf of, and in coordination with, its member agencies.

- Public affairs workgroup
- Poster/slogan contest
- Local and regional events
- Speakers bureau
- Facility inspection trips of MWD, SWP, and GWRS facilities
- Information materials
- Water quality reports
- Media relations

In addition, the District provides public information directly to its customers to raise awareness of water usage and conservation efforts. For example, a drought tolerant landscape beautification contest was jointly funded by the District and Villa Park in 2010. The District regularly distributes a variety of information materials to the public including billing inserts and

manager's reports to the Board of Directors with conservation information. Its billing system indicates water usage compared with previous year usage. The District actively encourages the media to highlight District efforts and activities. The District participates in the monthly Public Affairs Workgroup meetings conducted by MWDOC to coordinate public outreach efforts and share information on a countywide basis.

DMM H - School Education Programs

MWDOC's school education programs promote water conservation and water conservation related benefits and is considered one of the most successful and well recognized water education curriculums in Southern California. For more than 30 years, MWDOC teachers, assisted by its mascot "Ricki the Rambunctious Raindrop," have been educating students in grades Kindergarten through high school about the water cycle, the importance and value of water, and the personal responsibility we all have as environmental stewards. In 2004, MWDOC formed an exciting partnership with the Discovery Science Center that has allowed both organizations to reach additional Orange County students and provide them with even greater educational experiences in the areas of water and science.

Since its inception in January 1973, the MWDOC school education program has evolved into what has become the standard for water education curriculum. To date, nearly three million Orange County students have benefited from the program; during the 2010-11 school year, more than 70,000 students will have gone through this program. Because the District does not record these numbers, it is not know specifically how many students within the District service area have participated in the MWDOC water education program since 2000.

DMM I - Commercial, Industrial, and Institutional (CII) Programs

MWDOC offers financial incentives under the "Save Water Save a Buck" rebate program, which offers rebates for various water efficient devices to CII customers, and the Water$mart hotel program. The District is not participating in these programs because of its limited number of commercial and institutional customers, and lack of hotels.

DMM J - Wholesale Agency Programs

The District receives assistance to implement water use efficiency programs from MWDOC. MWDOC provides financial incentives, conservation-related technical support, and regional implementation of a variety of BMP-based programs. In addition, MWDOC conducts research projects to evaluate implementation of both existing programs and new pilot programs. Providing regional programs on behalf of the District and other retail agencies in Orange County minimizes confusion to customers and maintains a consistent message to the public to use water efficiently.

DMM K - Conservation Pricing

The district's water rates clearly meet the CUWCC definition of "conservation pricing" that includes "rates designed to recover the cost of providing service". The District updated its water rate structure in 2009. It bills every month based on a fixed service charge for the first five units of water with usage above that amount billed per unit as a commodity charge. The service charge is based on meter size. The domestic water rate for connections 1 inch and under will increase annually up to $32.31 per month by FY 2011-12.

The fixed portion of the monthly charge is designed to cover the cost of water distribution, meter reading, and maintenance of the distribution system and a portion of the capital improvement program. The commodity component is structured to recover the actual cost of water, including the groundwater replenishment assessment, imported water charges, and energy and maintenance costs for the water production and treatment facilities.

DMM L - Water Conservation Coordinator

The District has an assigned Conservation Coordinator who is also the Associate General Manager. The District assigns staff to implement conservation programs as defined within each of the DMMs. District staff work closely with MWDOC's Water Use Efficiency staff to develop and implement District and regional programs.

DMM M - Water Waste Prohibition

The Board of Directors passed a resolution March 17, 2009 prohibiting waste and unreasonable use of water. These provisions are incorporated into the District's water conservation program as Section VI, located in Appendix F. It includes specific requirements, effective at all times, regarding the prohibition of wasting water.

DMM N - Residential ULFT Replacement Programs/Water-Sense Specification Toilets

Over the past 20 years, MWDOC has continuously implemented a regional ultra low flow toilet (ULFT) rebate and/or distribution program targeting single and multi-family residents in Orange County. Since the end of the distribution program in 2004, MWDOC's program now focuses on providing rebate incentives for retrofitting non-efficient devices with either ULFTs or high efficiency toilets (HETS) – toilets using 1.28 gallons per flush or less. The ULFT portion of this program concluded in June 2009. Over 364,000 ULFTs were replaced in single family and multi-family homes, with an overall program cumulative savings of approximately 138,500 acre feet throughout the county. The HET rebate program, which concluded in 2010, resulted in over 26,800 devices, with an overall program to-date savings of approximately 3,400 acre-feet throughout the county. The District had 21 HETs installed with a cumulative savings of 2.8 acre-feet and 757 UFLTs with a cumulative savings of 289 acre-feet.

6.3 Evaluation of Non-implemented DMMs

The District is or has implemented all of the DMMs described above except for DMM #I – Commercial, Industrial, and Institutional Programs. As discussed previously, the service area is composed of primarily low density, single family residential land uses with only one shopping center which also contains Villa Park City Hall and library. Program resources to aid these CII uses with water efficiencies, such as the previous ULFT program, are or were provided. There are no cooling towers, commercial clothes washers, hospital x-ray film processors, hotels, etc. in the service area that could benefit from this DMM. Therefore, it was determined to not be cost effective to allocate resources for implementing this DMM.

Appendix A

DWR 2010 UWMP Checklist

Serrano Water District

Appendix A

DWR 2010 Urban Water Management Plan Checklist

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
PLAN PREPARATION				
4	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	10620(d)(2)		Section 1.2
6	Notify, at least 60 days prior to the public hearing on the plan required by Section 10642, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Any city or county receiving the notice may be consulted and provide comments.	10621(b)		Section 1.3
7	Provide supporting documentation that the UWMP or any amendments to, or changes in, have been adopted as described in Section 10640 et seq.	10621(c)		Appendix C
54	Provide supporting documentation that the urban water management plan has been or will be provided to any city or county within which it provides water, no later than 60 days after the submission of this urban water management plan.	10635(b)		Section 1.3; Appendix C
55	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	10642		Section 1.2; Appendix C
56	Provide supporting documentation that the urban water supplier made the plan available for public inspection and held a public hearing about the plan. For public agencies, the hearing notice is to be provided pursuant to Section 6066 of the Government Code. The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water. Privately-owned water suppliers shall provide an equivalent notice within its service area.	10642		Section 1.3; Appendix C
57	Provide supporting documentation that the plan has been adopted as prepared or modified.	10642		Appendix C

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
58	Provide supporting documentation as to how the water supplier plans to implement its plan.	10643		Section 3.4; Appendix C; Table 16
59	Provide supporting documentation that, in addition to submittal to DWR, the urban water supplier has submitted this UWMP to the California State Library and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. This also includes amendments or changes.	10644(a)		Section 1.3; Appendix C
60	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the urban water supplier has or will make the plan available for public review during normal business hours	10645		Section 1.3; Appendix C
SYSTEM DESCRIPTION				
8	Describe the water supplier service area.	10631(a)		Section 2.2
9	Describe the climate and other demographic factors of the service area of the supplier	10631(a)		Section 2.3 and 2.4
10	Indicate the current population of the service area	10631(a)	Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M.	Section 2.4; Table 2
11	Provide population projections for 2015, 2020, 2025, and 2030, based on data from State, regional, or local service area population projections.	10631(a)	2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	Section 2.4; Table 2
12	Describe other demographic factors affecting the supplier's water management planning.	10631(a)		Section 2.4
SYSTEM DEMANDS				
1	Provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	10608.20(e)		Section 3.1; Tables 3, 4, & 5;

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
2	*Wholesalers:* Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. *Retailers:* Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009.	10608.36 10608.26(a)	Retailers and wholesalers have slightly different requirements	Section 3.4
3	Report progress in meeting urban water use targets using the standardized form.	10608.40		For 2015 UWMP
25	Quantify past, current, and projected water use, identifying the uses among water use sectors, for the following: (A) single-family residential, (B) multifamily, (C) commercial, (D) industrial, (E) institutional and governmental, (F) landscape, (G) sales to other agencies, (H) saline water intrusion barriers, groundwater recharge, conjunctive use, and (I) agriculture.	10631(e)(1)	Consider 'past' to be 2005, present to be 2010, and projected to be 2015, 2020, 2025, and 2030. Provide numbers for each category for each of these years.	Section 3.2 & 3.3; Tables 6 through 10 and 13
33	Provide documentation that either the retail agency provided the wholesale agency with water use projections for at least 20 years, if the UWMP agency is a retail agency, OR, if a wholesale agency, it provided its urban retail customers with future planned and existing water source available to it from the wholesale agency during the required water-year types	10631(k)	Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030.	Section 3.3.5; Table 15
34	Include projected water use for single-family and multifamily residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)		Section 3.3.2; Table 11
SYSTEM SUPPLIES				
13	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, and 2030.	10631(b)	The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided.	Section 4; Table 17
14	Indicate whether groundwater is an existing or planned source of water available to the supplier. If yes, then complete 15 through 21 of the UWMP Checklist. If no, then indicate "not applicable" in lines 15 through 21 under the UWMP location column.	10631(b)	Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other.	Section 4.2

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
15	Indicate whether a groundwater management plan been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	10631(b)(1)		Section 4.2.1; Mgnt Plan in e-version of Appendix E
16	Describe the groundwater basin.	10631(b)(2)		Section 4.2.1
17	Indicate whether the groundwater basin is adjudicated? Include a copy of the court order or decree.	10631(b)(2)		Section 4.2
18	Describe the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. If the basin is not adjudicated, indicate “not applicable” in the UWMP location column.	10631(b)(2)		NA
19	For groundwater basins that are not adjudicated, provide information as to whether DWR has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition. If the basin is adjudicated, indicate “not applicable” in the UWMP location column.	10631(b)(2)		Section 4.2
20	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	10631(b)(3)		Section 4.2; Table 18
21	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	10631(b)(4)	Provide projections for 2015, 2020, 2025, and 2030.	Section 4.2; Table 19
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)		Section 4.4; Table 20
30	Include a detailed description of all water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years, excluding demand management programs addressed in (f)(1). Include specific projects, describe water supply impacts, and provide a timeline for each project.	10631(h)		Section 4.7; Table 26
31	Describe desalinated water project opportunities for long-term supply, including, but not limited to, ocean water, brackish water, and groundwater.	10631(i)		Section 4.5

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
44	Provide information on recycled water and its potential for use as a water source in the service area of the urban water supplier. Coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	10633		Section 4.6
45	Describe the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	10633(a)		Section 4.6; Tables 21 & 22
46	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	10633(b)		Section 4.6.2; Table 21
47	Describe the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.	10633(c)		Section 4.6.2;
48	Describe and quantify the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.	10633(d)		Section 4.6.3; Table 23
49	The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	10633(e)		Section 4.6.3; Tables 23 & 24
50	Describe the actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.	10633(f)		Section 4.6.4; Table 25
51	Provide a plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.	10633(g)		Section 4.6.4; Table 25
WATER SHORTAGE RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING [b]				
5	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	10620(f)		Section 4
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage and provide data for (A) an average water year, (B) a single dry water year, and (C) multiple dry water years.	10631(c)(1)		Section 5.1 & 5.2

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
23	For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.	10631(c)(2)		Section 5.1.1; Table 27
35	Provide an urban water shortage contingency analysis that specifies stages of action, including up to a 50 percent water supply reduction, and an outline of specific water supply conditions at each stage	10632(a)		Section 5.3; Table 35
36	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.	10632(b)		Section 5.2.1; Table 31
37	Identify actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.	10632(c)		Section 5.3; Table 36-37
38	Identify additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.	10632(d)		Section 5.3.3; Table 36
39	Specify consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.	10632(e)		Section 5.3.3; Table 37
40	Indicated penalties or charges for excessive use, where applicable.	10632(f)		Section 5.3.3; Table 38
41	Provide an analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.	10632(g)		Section 5.3.6
42	Provide a draft water shortage contingency resolution or ordinance.	10632(h)		Appendix F
43	Indicate a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)		Section 5.3.7

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
52	Provide information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments, and the manner in which water quality affects water management strategies and supply reliability	10634	For years 2010, 2015, 2020, 2025, and 2030	Section 5.1.2; Table 28
53	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. Base the assessment on the information compiled under Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)		Section 5.2; Tables 29 through 34
DEMAND MANAGEMENT MEASURES				
26	Describe how each water demand management measures is being implemented or scheduled for implementation. Use the list provided.	10631(f)(1)	Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules.	Section 6; Tables 39 & 40
27	Describe the methods the supplier uses to evaluate the effectiveness of DMMs implemented or described in the UWMP.	10631(f)(3)		Section 6
28	Provide an estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the ability to further reduce demand.	10631(f)(4)		Section 6
29	Evaluate each water demand management measure that is not currently being implemented or scheduled for implementation. The evaluation should include economic and non-economic factors, cost-benefit analysis, available funding, and the water suppliers' legal authority to implement the work.	10631(g)	See 10631(g) for additional wording.	Section 6.3
32	Include the annual reports submitted to meet the Section 6.2 requirements, if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	Signers of the MOU that submit the annual reports are deemed compliant with Items 28 and 29.	NA

a The UWMP Requirement descriptions are general summaries of what is provided in the legislation. Urban water suppliers should review the exact legislative wording prior to submitting its UWMP.

b The Subject classification is provided for clarification only. It is aligned with the organization presented in Part I of this guidebook. A water supplier is free to address the UWMP Requirement anywhere with its UWMP, but is urged to provide clarification to DWR to facilitate review.

Appendix B

References

Appendix B – References

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Appendix C

Public Participation and Plan Adoption

Notification letters were sent to the following agencies 60 days prior to the public hearing on the draft UWMP. A copy of one letter is provided in this appendix.

- **City of Orange**
- **City of Villa Park**
- **Municipal Water District of Orange County**
- **Orange County Water District**
- **County of Orange**

SERRANO WATER DISTRICT

18021 EAST LINCOLN STREET
VILLA PARK, CA 92861-6446
714-538-0079

Directors
Lloyd Appelman, President
Robert F. Rickerl, Vice President
Jerry L. Haight
C.L. "Larry" Pharris, Jr.
Richard A. Freschi

David H. Noyes, Contract General Manager

April 13, 2011

Mr. John Sibley
City Manager
City of Orange
P.O. Box 449
Orange, CA 92866

Re: Notification of Serrano Water District 2010 Urban Water Management Plan Preparation

Dear Mr. Sibley:

As required by the Urban Water Management Planning Act (Act) of the California Water Code, this letter serves as formal notification that the Serrano Water District is currently updating its Urban Water Management Plan (UWMP) and will be holding a public hearing on the draft report. The Act specifically requires urban water suppliers providing water to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, to update their UWMP every five years. This is Serrano Water District's first UWMP. The 2010 UWMP must be approved by July 1, 2011 and submitted to the California Department of Water Resources.

We welcome your agency's assistance and involvement. A draft of the District's 2010 UWMP will be available for your agency's review prior to the District's public hearing. We will e-mail a copy of the draft UWMP to your agency by May 13, 2011. The public hearing is scheduled for June 14, 2011 at 8:30 am at the District office located at 18021 Lincoln Street, Villa Park, CA 92861. We would appreciate any comments you have on the draft UWMP prior to the public hearing.

Please contact me at (714) 538-0079 if you have any questions. We will provide a copy of the final UWMP to your agency within 30 days of adoption.

Sincerely,

Timothy DeTurk
Associate General Manager

.AFFIDAVIT OF PUBLICATION

STATE OF CALIFORNIA,)
) ss.
County of Orange)

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of **The Orange County Register**, a newspaper of general circulation, published in the city of Santa Ana, County of Orange, and which newspaper has been adjudged to be a newspaper of general circulation by the Superior Court of the County of Orange, State of California, under the date of 1/18/52, Case No. A-21046, that the notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

May 10, 17, 2011

"I certify (or declare) under the penalty of perjury under the laws of the State of California that the foregoing is true and correct":

Executed at Santa Ana, Orange County, California, on

Date: May 17, 2011

Signature

The Orange County Register
625 N. Grand Ave.
Santa Ana, CA 92701
(714) 796-7000 ext. 2209

PROOF OF PUBLICATION

Proof of Publication of

NOTICE OF PUBLIC HEARING
SERRANO WATER DISTRICT
2011 URBAN WATER MASTER PLAN

PLEASE TAKE NOTICE that, in accordance with California Water Code Sections 10608.26 and 10642, the Serrano Water District will hold a public hearing at 8:30 a.m. on June 14, 2011, to consider adoption of the draft 2011 Serrano Water District Urban Water Management Plan ("2011 Plan"), including the component in the 2011 Plan for sustainable water use and demand reduction ("Demand Reduction Program"). The public hearing will be held at the office of the Serrano Water District, located at 18021 East Lincoln Street, Villa Park, CA 92861.

At the public hearing, members of the public will have an opportunity to provide input regarding, among other issues relating to the Plan and the Demand Reduction Program, its implementation, plan, the economic impacts of the implementation plan, and the proposed method for determining the urban water use target selected for the Demand Reduction Program. District.

A copy of the draft 2011 Plan, which includes the Demand Reduction Program, is on file at the above-described office of Serrano Water District and is available for public review and inspection. Questions relating to the 2011 Plan, the Demand Reduction Program, or the June 14, 2011 public hearing on the Plan and the Demand Reduction Program, should be directed to Tom DeTurk at (714-538-0079), or 4swdgm@gmail.com

Publish: Orange County Register May 10, 17, 2011 R-735

RESOLUTION NO. 06-11-01

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE SERRANO WATER DISTRICT ADOPTING THE DISTRICT'S 2010 URBAN WATER MANAGEMENT PLAN WITH SUSTAINABLE WATER USE AND DEMAND REDUCTION TARGETS AND IMPLEMENTATION PLAN

WHEREAS, the Serrano Water District ("District") is an "urban water supplier" within the meaning of the Urban Water Management Planning Act, Water Code § 10610, *et seq.* ("UWMP Act"), and an "urban wholesale water supplier" within the meaning of the state legislation requiring sustainable water use and demand reductions to achieve a statewide 20% water use reduction by the year 2020, codified as Water Code § 10608, *et seq.* (the "20/20 Act"); and

WHEREAS, the UWMP Act requires the District and other urban water suppliers to adopt, by July 1, 2011, an urban water management plan that describes and evaluates the sources of supply, reasonable and practical efficient uses, reclamation, and demand management activities of the District; and

WHEREAS, the 20/20 Act requires the District and other urban wholesale water suppliers to include in their urban water management plans an implementation plan for compliance with the 20/20Act) to help achieve the water reductions required by the 20/20 Act (the "20/20 Provisions"); and

WHEREAS, the District has caused to be prepared a draft Urban Water Management Plan to meet the requirements of the UWMP Act, including the components required by the 20/20 Act (the "Plan"); and

WHEREAS, on or about April 13, 2011, and at least sixty (60) days prior to the public hearing on the draft Plan, the District notified the cities of Villa Park and Orange, and the County of Orange, as the cities and county within which the District provides water supplies, that the District would be considering adoption of the draft Plan; and

WHEREAS, on June 14, 2011, and after having made the draft Plan available for public inspection, the Board of Directors conducted a duly noticed public hearing in accordance with §§ 10642 and 10608.26 of the California Water Code with regard to the draft Plan, including the provisions required by the 20/20 Act. At that public hearing, the Board of Directors considered public testimony on the Plan and, with respect to the 20/20 provisions of the Plan, the implementation plan, the economic impacts of the proposed implementation plan and the allowable methods for determining the demand reduction target under the 20/20 Act.

NOW, THEREFORE, the Board of Directors of the Serrano Water District does hereby resolve as follows:

Section 1. The District Board of Directors finds and declares as follows;

(a) The Board of Directors has allowed community input regarding the District's implementation plan for complying with the 20/20 Act as set forth in the draft Plan, considered the economic impacts of the District's implementation plan for complying with the 20/20 Act, and in accordance with Water Code § 10608.20(b) has selected the method of 80% of the District's baseline per capita daily water use as its method for determining its urban water use target.

(b) The draft Plan fully and adequately describes and evaluates the sources of supply, the reasonable and practical efficient uses, reclamation, and demand management activities within the District, in accordance with the UWMP Act.

Section 2. The Board of Directors of the District approves the following in connection with the draft Plan:

(a) The method of 80% of the District's baseline per capita daily water use as its method of determining the District's use target, as set forth in the draft Plan; and

(b) The implementation plan for achieving compliance with the 20/20 Act, as set forth in the draft Plan.

Section 3. The Board of Directors of the District hereby adopts the Plan, in the form presented by District staff, as the District's 2010 Urban Water Management Plan.

Section 4. The District Secretary is hereby authorized and directed to submit a copy of the adopted Plan to the California Department of Water Resources, to the California State Library, to the cities of Villa Park and Orange, and to the County of Orange, within thirty (30) days of the date of this Resolution. The District Secretary is further authorized and directed, not later than thirty (30) days after filing a copy of the Plan with the California Department of Water Resources, to make the adopted Plan available for public review at the District offices during normal business hours.

PASSED and ADOPTED at a regular meeting of the Serrano Water District Board of Directors held on JUNE 14, 2011, by the following vote:

Directors: Yes: Rickerl, Freschi, Haight, Appelman, Pharris, Jr.

Directors: No:

Directors: Absent:

President, Serrano Water District

ATTEST:

Secretary, Serrano Water District

Appendix D

Agreement for Purchase and Sale of Surplus Water

Agr. 2453.4
C.2

AGREEMENT FOR PURCHASE AND SALE OF SURPLUS WATER

THIS AGREEMENT FOR PURCHASE AND SALE OF SURPLUS WATER (hereinafter, the "Agreement") is entered into as of June 2, 2005, by and between SERRANO WATER DISTRICT, a special governmental district formed and operating under the Irrigation District Law, California Water Code Section 20500, et seq. (hereinafter, "Serrano"), and the CITY OF ORANGE, municipal corporation formed and operating under the general laws of the State of California (hereinafter, "Orange").

RECITALS

A. Orange owns and operates a domestic water distribution system for the delivery of potable water to the lands and residents within its service boundaries (hereinafter, the "Orange Water System"). Orange delivers through the Orange Water System both groundwater produced by Orange, and treated imported water purchased from the Metropolitan Water District of Southern California ("MWD") through the Municipal Water District of Orange County ("MWDOC"). In consideration for the delivery of such treated imported water, Orange pays to MWDOC, as the wholesaler of MWD treated imported water, a blended rate that includes, among other components, the costs of water and treatment, a meter fee and a readiness to serve charge (such total cost paid to MWDOC and/or to MWD to purchase an acre-foot of MWD treated imported water, whose components and/or methodology may be modified in the future by MWDOC or MWD, is hereinafter referred to as the "MWD Treated Imported Water Rate"). As of the date of this Agreement, the MWD Treated Imported Water Rate is $475.50 (four hundred seventy-five dollars and 50 cents) per acre-foot.

B. Serrano owns and operates a domestic water distribution system for the delivery of potable water to the lands and residents within its service boundaries (hereinafter, the "Serrano Water System"). In addition to producing groundwater for delivery through the Serrano Water System, Serrano treats and delivers surface water stored in Santiago Reservoir, also known as "Irvine Lake" (such water is hereinafter referred to as "Surface Water"). Serrano obtains Surface Water by means of water rights which Serrano holds in and to a portion of the flow of Santiago Creek; and Serrano captures, diverts and stores these Surface Water flows, together with occasional deliveries of untreated MWD imported water ("Untreated Imported Water"), in Santiago Reservoir. Serrano also captures and diverts surface water behind the Villa Park Dam on Santiago Creek. Serrano treats its Surface Water and Untreated Imported Water supplies at a water treatment facility owned and operated by Serrano. Serrano delivers this treated water to its customers through the Serrano Water System.

C. The Serrano Water System is adjacent to the Orange Water System, and interconnections have been installed to transfer water between the two water systems.

D. Orange desires to purchase treated water from Serrano.

E. From time to time, Serrano has surplus Surface Water which, if not put to beneficial use, will evaporate or otherwise go to waste. At other times, Serrano has access to Untreated Imported Water which is available for sale to Orange. Serrano desires to sell to Orange, and Orange desires to purchase from SWD, treated Surface Water ("Treated Surface Water") when such water is surplus to Serrano's needs. Serrano also desires to sell to Orange,

and Orange desires to purchase from Serrano, available Untreated Imported Water that SWD has treated and distributed into the Serrano Water System (such water is hereinafter referred to as "Treated Imported Water") (such surplus Treated Surface Water and Treated Imported Water is hereinafter collectively referred to as "Surplus Treated Water").

F. Serrano has the authority under Water Code Section 22228 to enter into and perform any agreement with any person, public corporation or agency for the exchange, transfer or delivery to or by either or both parties of any water right or water. Serrano also has the authority under Water Code Section 22259, if its board of directors deems it to be in the best interests of Serrano, to enter into a contract for the lease or sale of any surplus water or use of surplus water not then necessary for use within its boundaries, for use either within or without the boundaries of Serrano.

EXECUTORY AGREEMENTS

NOW, THEREFORE, in consideration of the facts recited above, and the covenants, conditions and promises contained herein, the parties agree as follows:

1. Sale of Treated Surface Water. Subject to the conditions noted in Paragraphs 1.1 and 1.2 below, and subject to the availability of Surface Water, Serrano agrees to make available for sale to Orange a minimum of 1000 acre feet of Treated Surface Water each year during the term of this Agreement. At the beginning of each fiscal year, Serrano shall provide Orange with written notice of the actual quantity of Treated Surface Water that is available and a schedule by which such water can be delivered to Orange.

1.1 Orange acknowledges that, under the instruments governing Serrano's water rights in Santiago Creek and its ownership interest in Santiago Reservoir, the Irvine Ranch Water District ("IRWD") has a first right of refusal to purchase any and all surplus Surface Water stored in Santiago Reservoir, and that Serrano cannot declare any surplus Surface Water to be available for sale to Orange as Treated Surface Water until Serrano has first offered such water for sale to IRWD and IRWD has declined such offer.

1.2 Orange acknowledges that there may be periods in which Serrano has no surplus Surface Water for treatment and delivery to Orange as Treated Surface Water.

1.3 Upon notification by Serrano of the amount of Treated Surface Water available, Orange shall notify Serrano of its intention to purchase all or a portion of such Treated Surface Water during the year. Orange agrees to purchase a minimum of 1000 acre feet of Treated Surface Water per year, subject to: (1) the conditions noted in Paragraphs 1.1 and 1.2 above; (2) that Orange has the ability to accept the water at the interconnections designated in Paragraph 3; and (3) that the water meets state and federal water quality standards. Orange shall also notify Serrano of the schedule by which it will take delivery of the Treated Surface Water and the location(s) at which it will take delivery.

1.4 All Treated Surface Water delivered by Serrano to Orange shall be billed at a per acre-foot rate equal to 85% of the MWD Treated Imported Water Rate in effect as of the date of the Treated Surface Water delivery to Orange.

2. Sale of Treated Imported Water.

2.1 In the event that Serrano has no surplus Treated Surface Water, but can purchase Untreated Imported Water at a rate no greater than the then-effective MWDOC rate for untreated MWD imported water, Serrano shall notify Orange of the availability of Untreated Imported Water for purchase, treatment and delivery by Serrano to Orange as Treated Imported Water. If Orange desires to purchase such Treated Imported Water, Serrano shall obtain such Untreated Imported Water for treatment, sale and delivery as Treated Imported Water to Orange.

2.2 All Treated Imported Water delivered by Serrano to Orange shall be billed at a per acre-foot rate equal to 90% of the MWD Treated Imported Water Rate in effect as of the date of the Treated Imported Water delivery to Orange.

3 Surplus Treated Water Delivery and Pressures. Surplus Treated Water purchased under this Agreement shall be delivered at the following pressures when taken at the following locations:

Interconnection Location	Pressure
Lockett Reservoir	20 PSI
Santiago Road	100 PSI

Surplus Treated Water shall be deemed delivered and sold by Serrano to Orange when such water passes the Serrano meter at the interconnection location designated by Orange for the delivery of such water. The parties hereto acknowledge that Surplus Treated Water purchased by Orange from Serrano may come from a variety of sources, including but not limited to surface flows of Santiago Creek and its tributaries, imported MWD water from different sources, or a blend of such waters.

4. Invoicing and Payment for Purchased Surplus Treated Water.

4.1 Serrano shall read its meters at all interconnection locations at which Orange takes delivery of Surplus Treated Water from Serrano, and Serrano shall invoice Orange for such water on the basis of the meter readings within thirty (30) days following the date of delivery.

4.2 Within thirty (30) days of receipt of an invoice from Serrano for the sale of Surplus Treated Water, Orange shall pay such invoice.

5. No Conveyance of Water or Facility Rights Intended. Serrano and Orange mutually understand and agree that this Agreement is not intended to and does not constitute a lease, sale, assignment, conveyance or other transfer to Orange, of either:

5.1 Any appropriative, contractual, riparian, prescriptive, overlying or other water right, or any other right or entitlement to water or the delivery of water, or any water storage right, including but not limited to any right under the instruments governing

Serrano's water rights to Santiago Creek Water and rights to impound and store water in the Santiago Reservoir.

5.2 Any legal, beneficial or possessory right, title or interest in any Serrano facility, including but not limited to the Serrano water treatment facility or any pipelines used to transmit Surplus Treated Water to Orange.

6. Orange Indemnification of Serrano. Neither Serrano nor any officer, director, employee or representative of Serrano (hereinafter, collectively, the "Serrano Parties") shall be responsible for any damage or liability occurring by reason of anything done or omitted to be done by Orange in the performance or under the authority of this Agreement. Pursuant to Government Code Section 895.4, Orange shall fully indemnify, defend and hold Serrano and the Serrano Parties harmless from any liability imposed for injury (as defined in Government Code Section 810.8) occurring by reason of anything done or omitted to be done by Orange in the performance or under the authority of this Agreement.

7. Serrano Indemnification of Orange. Neither Orange nor any officer, director, employee or representative of Orange (hereinafter, collectively, the "Orange Parties") shall be responsible for any damage or liability occurring by reason of anything done or omitted to be done by Serrano in the performance or under the authority of this Agreement. Pursuant to Government Code Section 895.4, Serrano shall fully indemnify, defend and hold Orange and the Orange Parties harmless from any liability imposed for injury (as defined in Government Code Section 810.8) occurring by reason of anything done or omitted to be done by Serrano in the performance or under the authority of this Agreement.

8. Disputes. If any legal action or proceeding is necessary to interpret or enforce any of the terms or conditions of this Agreement, the prevailing party shall be entitled to its legal fees incurred in such legal action, in addition to any other relief to which it may be entitled.

9. Waiver of Breach. No failure on the part of either party hereto to insist upon or demand the strict performance by the other of any covenant, term, condition or promise of this Agreement, or to exercise any right or remedy as a result of any breach thereof, shall constitute a continuing waiver of any such breach or of any such covenant, term, condition or promise. No waiver of any breach shall in any way affect, alter or modify this Agreement, but each and every covenant, term, condition and promise of this Agreement shall continue in full force and effect.

10. Notices. Except as otherwise set forth hereinabove, all notices, payments, transmittals of documentation and other writings required or permitted to be delivered or transmitted to any of the parties under this Agreement shall be personally served or deposited in a United States mail depository, first class postage prepaid, and addressed as follows:

If to Serrano:

Serrano Water District
18021 Lincoln Avenue
Villa Park, California 92667
Attn: General Manager

If to Orange: City of Orange
300 E. Chapman
Orange, California 92666
Attn: Water Manager

or such other address or person as either party may direct to the other in writing. Except where service is by registered or certified mail, return receipt requested, service of any instrument or writing shall be deemed completed forty-eight (48) hours after deposit in a United States mail depository.

11. Warranty of Authority. Each officer of Serrano and Orange affixing his or her signature below thereby warrants and represents that he or she has the full legal authority to bind his or her respective party to all of the terms, conditions and provisions of this Agreement, that his or her respective party has the full legal right, power, capacity and authority to enter into this Agreement and perform all of the obligations herein, and that no other approvals or consents are necessary in connection therewith.

12. Term and Termination. The term of this Agreement shall be for five (5) years. Upon the expiration of this initial five-year term, the Agreement shall automatically be renewed for an additional five (5) years unless one of the parties gives to the other party written notice of non-renewal within thirty (30) days prior to the expiration of the initial term.

13. Headings. The titles and headings of Sections and Paragraphs of this Agreement, as herein set forth, have been inserted for the sake of convenience only, and are not to be taken, deemed or construed to be any part of the terms, covenants or conditions of this Agreement, or to control, limit or modify any of the terms, covenants or conditions hereof.

14. Force Majeure. The obligations by any party hereunder shall not be deemed to be in default where delays or failures to perform are due to any cause without the fault and beyond the reasonable control of such party. If written notice of such delay or impossibility of performance is provided to the other party within a reasonable time after the commencement of such delay or condition of impossibility, an extension of time for such cause will be granted in writing for the period of the enforced delay, or longer as may be mutually agreed upon by the parties in writing, or the performance rendered impossible may be excused in writing by the party so notified.

15. Severability . If any term, provision, covenant, or condition of this Agreement is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions of this Agreement shall continue in full force and effect, unless and to the extent the rights and obligations of either party has been materially altered or abridged by such holding.

16. Integration, Construction and Amendment. This Agreement represents the entire understanding of Serrano and Orange as to those matters contained herein, and no prior oral or written understanding shall be of any force or effect with respect to those matters covered by this Agreement. This Agreement shall be governed by the laws of the State of California and construed as if drafted by both of the parties hereto. This Agreement may not be modified, altered or amended except in writing signed by Serrano and Orange.

17. Successors. This Agreement, and all of the terms, conditions and provisions herein, shall inure to the benefit of, and be binding upon, Serrano and Orange; provided, however, that neither party may assign any of its rights or obligations under this Agreement without the prior written consent of the other.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

SERRANO WATER DISTRICT

By: _____
President

By: _____
Secretary

APPROVED AS TO FORM:

RUTAN & TUCKER

By: _____
General Counsel,
Serrano Water District

CITY OF ORANGE

By: _____
Mark A. Murphy, Mayor

ATTEST:

_____ Deputy
City Clerk, City of Orange

APPROVED AS TO FORM:

By: _____
City Attorney, City of Orange

Appendix E

Operating Agreement Between the Irvine Company and SWD

OCWD Groundwater Management Plan

(provided in electronic version)

THIS AGREEMENT, made and entered into in triplicate this 6th day of February, 1928, by and between THE IRVINE COMPANY, a corporation duly organized and existing under the laws of the State of West Virginia, with its principal place of business in Tustin, Orange County, California, and herein referred to as first party, and the CARPENTER IRRIGATION DISTRICT, a public corporation organized under the laws of California, and the SERRANO IRRIGATION DISTRICT, a public corporation organized under the laws of California, herein designated the second parties,

W I T N E S S E T H :

That, WHEREAS, the Carpenter Irrigation District, one of the second parties herein, is the successor in interest of The John T. Carpenter Water Company, a corporation, in the diverting, handling and distribution of water to and for land owners in the same territory covered by the water system of said water company, which territory is within the boundaries of said Carpenter Irrigation District; and the Serrano Irrigation District, the other of the second parties herein, is the successor in interest of Serrano Water Association (unincorporated) in the diverting, handling and distributing of water to and for land owners in the same territory covered by the water system of said water association, which territory is now within the boundaries of said Serrano Irrigation District; and

WHEREAS, the parties hereto claim to be entitled to the use of all the water flowing in that certain stream commonly known as Santiago Creek, in Orange County, California, having acquired the same both as owners or representative of owners of lands riparian to said creek and by prior appropriation; and

WHEREAS, the proportion of said waters of said creek to which each of the parties hereto is entitled and the time and manner of use of the same has been duly defined and established by a

contract between the first party herein and the predecessors in interest of the second parties dated March 3, 1906, and confirmed by a judgment of the Superior Court of Orange County, California, rendered March 10, 1906, in an action in said Court, No. 3521, in which the first party was plaintiff and Ed H. Adams and others were defendants, as amended and modified by a contract between the same parties dated November 18, 1909, and confirmed by judgment of said court dated December 16, 1909; that the parties hereto, or their predecessors in interest, at all times since the dates of said contracts have been and are now using the waters of said creek for irrigation and domestic purposes in the proportions and in the manner defined by said contracts, by second parties and their predecessors upon certain lands in what is known as Villa Park-El Modena sections in Orange County, California, by first party upon a portion of the Rancho San Joaquin known as The Irvine Ranch; and

WHEREAS, it is the intention, understanding and agreement of the parties hereto that said contract made March 3, 1906, as modified by the contract dated November 18, 1909, and all the terms, conditions and provisions thereof which have not terminated by their own expressed limitation shall be and remain in full force and effect until the "Santiago Reservoir" herein provided for has been fully completed, and the distribution of water therefrom has been commenced; but when said reservoir has been completed and water begun to be distributed therefrom, that thereupon all terms and conditions of said prior contract which are in conflict with the terms and conditions of this contract shall cease and terminate and have no further force or effect; and

WHEREAS, the parties hereto or their predecessors in interest for many years last past, in order to conserve said waters and to obtain a greater supply of water for the irrigation of their said land or lands within their respective boundaries,

have been diverting and spreading the storm waters of said creek upon different spreading basins in Santiago Canyon by means of intakes and check-dams and also by means of check-dams placed in Ladd Canyon, a tributary of said Santiago Creek, as provided in the said contracts; and

WHEREAS, the parties hereto or their predecessors in interest have caused an extended study of the water-shed and water resources of said Santiago Creek and its tributaries to be made by Messrs. Howells & Howells, and Olmsted and Gillelen, Engineers, as a result of which a large water storage project in Santiago Creek appears to be justified, and such study indicates that the most feasible and economical site is that designated in the report of Howells & Howells, Engineers, heretofore rendered to the parties hereto and hereinafter designated as the "Santiago Reservoir", having a flow-line on 790 feet sea level, elevation U. S. G. datum, and flooding approximately 665 acres of valley and hillside land belonging to the said first party herein; and

WHEREAS, it is not determined, but may be determined in the future by the parties hereto, that it will be to their mutual benefit to further conserve the overflow and storm waters of Santiago Creek by erecting a dam at a lower point on Santiago Creek on land owned by second parties or persons they represent, herein known as the "Barham Ranch", hereinafter designated "Lower Reservoir", and by the erecting of a dam in Fremont Canyon, the waters of which canyon flow into said Santiago Creek below the said "Santiago Reservoir";

NOW, THEREFORE, in order to carry into effect the foregoing intents and purposes, and in consideration of the mutual advantages and benefits derived by each of the parties hereto from the carrying out of the foregoing development, IT IS HEREBY MUTUALLY AGREED by and between the parties hereto each with the other as follows, to wit:

FIRST

Preliminary Preparation.

That immediately after the execution of this agreement or within such time as it can reasonably be done, each of the second parties hereto shall take and prosecute such proceedings as may be necessary or legally required to authorize, vote and create, to issue and sell a bond issue and bonds of its district in amount or amounts to raise a sufficient fund of money to erect, complete and pay for at least their part of the "Santiago Reservoir" dam and other work connected therewith as hereinafter provided for, and as much more as they may deem best; and the first party will then execute the proper deeds conveying to second parties all lands in the Santiago Creek located on the Irvine Ranch which may be required for the erection, maintenance, repair and replacement of the said Santiago dam, also for the overflow or flooding by the reservoir formed by the said dam, and also for the pipe lines or other conduits for conducting water into or out of such reservoir by the parties hereto in the manner herein specified, and also for telephone, power lines and for roads, all such deeds to provide that all lands thereby conveyed shall be used exclusively for such purposes for which the lands are conveyed as above provided, and if said land or any part thereof so conveyed should be abandoned or not so used, it shall revert to the grantor. A dis-use for one year shall constitute an abandonment so far as any particular road or telephone or power line is concerned, provided said use has commenced.

When the funds of second parties are available for the purpose and such deeds are executed, then the parties hereto shall proceed with the diligent performance of the remaining provisions of this agreement.

SECOND

Dam and Reservoir.

That said second parties shall first thereafter proceed with proper diligence to erect, construct and fully complete a hydraulic fill dam across the channel of Santiago Creek, at or near the fourth road crossing of said creek, which crossing is located North 42° West 4725 feet from the East corner of Block 69 of Irvine Subdivision of the Rancho San Joaquin, etc., according to map recorded in Book 1, page 88, Map Records of Orange County, California, which dam shall be the plan designated U. 790, having a flow-line on 790 feet sea level and forming a reservoir having a capacity of 25,880 acre feet of water, estimated to cost approximately $550,000, and shall be so erected, constructed and completed according to the plans and specifications contained in the report made by Howells and Howells, Engineers, a copy of which report is in the hands of each of the parties hereto and made a part hereof, which said plans and specifications contained in said report shall not be changed or modified except by an agreement in writing of the parties hereto particularly specifying the change to be made.

The reservoir formed by said dam shall be known as "Santiago Reservoir".

That the erection and completion of said dam shall be under the exclusive direction, supervision and control of said second parties and at their direct cost and expense; that said first party herein, in consideration of the use of the reservoir formed by said dam and the delivery to and use of water stored therein to said first party as provided in this agreement, shall pay, in addition to the lands conveyed as above provided, to said second parties, a sum of money equal to one-half of the total cost of said dam and its appurtenances, including Engineers' fees, and all other actual costs, such money to be paid in stallments as and when second parties, under their agreement for construction of

said dam, are to pay the cost of such dam, it being understood that the second parties pay their installments, respectively, of their one-half of such cost contemporaneously when the first party pays its respective installments. The fees and expenses heretofore incurred or paid by either party hereto to Messrs. Howells & Howells, and Olmsted and Gillelen, Engineers, for work in connection with said reservoir, shall be treated as a portion of the actual costs of said dam. If at any time after said dam is partially constructed either party hereto should not have sufficient funds on hand to pay their respective shares for the completion of said dam, then the party having such funds, at its option, may and shall have the right to complete the erection and construction of the said dam, and any moneys advanced by it to carry the share of expenses that should be paid by the parties so failing to pay, shall draw one percent per month interest until paid.

THIRD

Spreading Water and Use of Check-Dams.

The parties hereto shall continue to use and apportion all of the waters of said Santiago Creek and its tributaries, both surface and sub-surface flow, together with the check-dams and gravel basins heretofore and now used for the conservation and spreading of water in the same manner as they are being used by the parties hereto at the date of the execution of this agreement, and as provided for in the said contracts, until the "Santiago Reservoir" above referred to shall be completed and accepted and the water impounded ready for distribution; that when said "Santiago Reservoir" shall have been so completed, impounding water and the water ready for distribution, all check-dams and gravel basins heretofore used for the storage of water above the said "Santiago Reservoir" shall be abandoned and their use by the said second parties shall cease and terminate and all rights heretofore granted therefor shall revert to the said first party herein; that the second

parties herein shall have the right to the use of all gravel beds below said "Santiago Reservoir" heretofore used for the spreading of the waters of said creek, or any portion thereof, as provided for in said contracts, so long as the first party shall remain the owner of the land covered by the same, but in any event second parties shall have the right to the use of said gravel beds or spreading basins as provided in said contracts for a period of five (5) years from and after the completion and erection of the dam to be erected for the formation of "Santiago Reservoir", and at the end of said period the right of the said second parties to the use of the same shall cease and terminate and the same shall revert to the said first party.

FOURTH

Prior Use of Water for Riparian Owners.

The second parties herein, or their successors in interest, shall have the first or prior right to take and distribute during the period of each year beginning June 20th at 12:00 M. and ending November 20th, at 12:00 M., to and for the use of owners of lands within the boundaries of second parties, and which owners have heretofore used and are now using the waters of said creek for irrigating approximately 2500 acres of land, an amount of the water not exceeding in quantity 1000 acre feet of the water impounded in said "Santiago Reservoir", the waters so taken to be measured and delivered at intakes installed by second parties at the dam of said reservoir.

That the right above mentioned shall be prior to the rights of all parties hereto to the waters or use thereof in said reservoir, and all measurements, divisions or allocations of water in said reservoir between the parties hereto shall be subject and subordinate to such prior right above mentioned.

That the said first party shall not install, maintain or operate any pumping plant or any submerged dam, or install, main-

tain or operate any other device for raising water, either in the Santiago Canyon or in any of the smaller canyons draining into same except for raising or otherwise securing the waters allotted to it as its proportion of the waters in said "Santiago Reservoir", or in any other reservoir constructed in accordance with this agreement, except that the first party herein as the owner of lands riparian to said creek shall have the right to use within its watershed any waters of said creek, exclusive of the waters contained in said reservoir, for watering stock, for drinking, washing and other domestic uses; provided, however, that if the said first party shall in the aggregate use for said purposes waters of said creek obtained by means of wells placed on the lands of the first party from the flow of waters that would naturally supply the waters of said creek, an amount in excess of 150 acre feet during said year for water use commencing November 20th of each year, then all amounts in excess thereof shall be measured and charged to said first party and considered in the allocation of waters to said first party from said reservoir; provided, however, that first party shall have the right to put down wells within the watershed of Santiago Creek or its tributaries and take and use any of the waters so developed in said wells for whatsoever purpose it so desires, provided such water in said wells shall be taken from geological strata below the strata from which drainage into the Santiago Creek or its tributaries takes place, and that no depletion in surface or underground flow of said Santiago Creek or its tributaries is caused by the operation of any wells so put down. If the parties hereto are unable to agree upon the amount of waters so used by said first party for domestic purposes as hereinbefore set forth, or should not be able to agree whether or not water obtained from wells was obtained from wells not in any way depleting the waters of said creek or waters that naturally would drain into the reservoir hereinbefore provided for, then the said matter or matters upon

which said parties shall not agree shall be left to arbitration as provided for in subdivision Ninth hereof.

FIFTH

Division of Remaining Water in said Reservoir.

That after the completion of the "Santiago Reservoir" as hereinabove provided, when water has been caught and impounded therein, all such water remaining therein after the prior right to 1000 acre feet of water has been satisfied or reserved as above provided shall be divided between the parties hereto, and second parties hereby grant, cede and will deliver to the first party the portion of said waters as follows, to wit:

When there is less than 10,000 acre feet and more than 9,000 acre feet in the reservoir, including in said estimate the 1000 acre feet hereinbefore referred to, then the second parties, in addition to the said 1000 acre feet so reserved, shall each take 2000 acre feet, and the first party shall have the remainder. If there is less than 9,000 acre feet, including said 1000 acre feet so reserved, then the 1000 acre feet so reserved shall go to the second parties, and of the balance the first party shall have one-half and the second parties each one-fourth. If said reservoir should contain 10,000 acre feet or more, then after the prior right to 1000 acre feet of water has been satisfied as above provided, the said first party shall be entitled to 5,000 acre feet and the second parties shall each be entitled to 2,000 acre feet. That during such years as the reservoir shall contain in excess of 22,-000 acre feet, first party shall be entitled to use, in addition to said 5,000 acre feet, such excess water in an amount not to exceed 2000 acre feet, and during such years as the reservoir contains 24,000 acre feet or more, the excess amount of water over and above said 24,000 acre feet shall be available for use by any of the parties hereto in such amount as it may desire, but if two or more of said parties hereto desire to use the same, the water

shall be delivered one-half to the first party and the remainder to second parties in equal shares.

That to the amounts of water which first party shall be entitled to in any water year from said reservoir as above provided, shall be added one-half of all the water diverted in such year for use by second parties from the Santiago Creek below the said dam and at the submerged dam of the said second parties, in addition to water stored in said reservoir; that said second parties shall continue to measure the water received at their point of intake near their submerged dam as they have done in the past and shall keep a record of the quantity received there as shown by such measurements, and a quantity of water equal to one-half of the water diverted in any year for use at said point, in addition to water stored in said reservoir, shall be added to the amount which first party is entitled in such year to receive from the said reservoir and be delivered to it at its intake installed near the dam of said reservoir. It is agreed, however, that said second parties shall use this additional water, or water stored in lower reservoir, before they use the water from the Santiago Reservoir, and that the excess water from rainfall or other cause not diverted for use by the said second parties shall not be included in this additional water estimate for division of storage water. And excepting, if first party does not elect to join with second parties in the construction of the lower reservoir herein provided for, and second parties at their own expense construct the same, any waters conserved in said dam shall not be accounted for in the division of waters in said upper reservoir. The water so divided and distributed shall be measured at the dam and delivered into the intakes of the respective parties installed at the dam of said reservoir; and such water so received may be used by the respective parties at any time and at any place desired by such party.

SIXTH

Supervision of Operations - Measuring Water.

That the said second parties shall have the exclusive management and supervision of the operation of said "Santiago Reservoir" and the measuring and distribution of water therefrom. That for that purpose said second parties shall employ a superintendent acceptable by or agreeable to all parties to this agreement and who shall have the actual control and superintendence of the operation of said reservoir and measuring and distributing water, but such superintendent shall be subject to the direction of the said second parties. That said first party may consult and advise with such superintendent and serve notices or demands upon him concerning any matters affecting the interest of said first party.

That in the erection of the dam of said reservoir proper outlets shall be constructed through which water may be taken from the reservoir, and that at all such outlets there shall be a proper meter or measuring device which will determine the quantity of flowing water delivered to either of the parties hereto, and there shall also be placed within the reservoir some device which will show the depth of water in the reservoir and the dimensions of the body of water impounded therein from which may be determined the quantity of water impounded in the reservoir.

That all measuring devices of water shall be of the most improved and most accurate kind, and the process of measuring water shall be of the last and best approved design or plan.

That the water year shall begin on November 20th at 12:00 o'clock, M., and at that time the quantity of water impounded in the dam shall be measured and shall then be allocated or divided between the parties hereto in accordance with the provisions of subdivision Fifth, provided, however, that measurements of the quantity of water impounded in the reservoir may be made and taken at such other times as the superintendent may deem advisable or

either of the parties hereto may desire, and in any event shall be taken on April 20th of each year for the purpose of determining the total amount of water added during the winter season to the waters in said reservoir at the commencement of said water year, November 20th, taking into consideration the amount of water used by either party between the commencement of said water year, November 20th, and the following April 20th, and that said allocation or division shall be on the basis set by subdivision Fifth and finally determining the division of waters for said water year between the parties hereto.

That a record shall be made and kept by the superintendent of all waters measured in the reservoir and the date and quantity of water found therein and the quantity of water measured and delivered to each of the parties hereto, on the first of each calendar month following, and copies of such record shall be delivered to either of the parties hereto upon request, and each party shall be entitled to an inspection of such record whenever desired within reasonable office hours.

SEVENTH.

Upkeep and Repairs.

The said second parties herein shall supervise, do and perform all work necessary to keep the dam forming the "Santiago Reservoir" and all things in connection therewith in good order and repair; to make from time to time all repairs, replacements and additions required; to keep everything in connection therewith in good workable order, including spillway and freeboard; to stop any leaks that may come into the dam; to replace any washout; to keep meters or measuring devices and all outlets in the dam in good order; if found necessary or convenient to perform said work, said second parties may in addition to the superintendent keep a man continuously at or near the said dam to watch the same, and immediately repair any leaks or breaks that may arise, and particularly

to immediately notify the superintendent of impending dangers, and for that purpose to keep the said watchman and superintendent in telephone communication, maintaining a telephone at said dam for that purpose; that all money expended for labor and material in making said repairs, including the wages of the watchman and other help, and the salary of the superintendent, shall be deemed expenses in the operation of said reservoir. A detailed account shall be kept of such expenses and a copy of such account shall be rendered monthly or quarterly, as may be found most convenient, to first party, and first party shall thereupon pay to the said second parties one-half of all such repairs and upkeep as shown by said account. Provided, however, that when any work or repairing or replacing shall cost more than the sum of One Thousand Dollars ($1,000), consent of first party shall be obtained before such cost shall be incurred or the work done.

EIGHTH

Accounts and Inspection.

The said second parties shall keep a detailed account of the costs of the erection of said dam and the installation of all outlets and meters or measuring devices, for all roads, telephones and other conveniences in connection therewith, and a detailed account of all money expended for repairs, replacements and additions necessary to the maintenance and operation of said reservoir, and shall render monthly or quarterly, as may be found most convenient, copy of such report to first party and shall notify either by phone or in writing the said first party, or its designated representative, of amy matters that should be considered or determined by first party in connection with either the construction or operation of said reservoir, dam or other things in connection therewith, and the said first party shall have the right at any time to inspect the work done upon said dam or anything in connection therewith, and to inspect the operation and upkeep of the same, and shall

have the right to consult with and interview the superintendent or the keeper or other representative of said second parties concerning the same, and to inspect the books of said second parties in which said accounts are kept, for the purpose of verifying said accounts, and shall have the right to be informed concerning all matters in connection therewith. Should the second parties for any reason at any time refuse to make necessary repairs to the said dam, the first party is hereby given the right to make such repairs, and the second parties to repay one-half of such cost, together with interest at the rate of one percent per month.

NINTH

Arbitration.

In the event questions concerning the construction, maintenance, repair or replacement of the said dam shall arise which require the determination of the parties hereto, a conference between them shall be called by written notice of the time and place of such conference, and a representative of each of the parties hereto, together with the superintendent, shall be had, and such questions shall be determined by the parties and satisfactory conclusions reached concerning the same, and such conclusions shall be placed in writing, signed by the parties, and shall thereafter govern their action or proceedings in relation to same.

If the parties fail to agree upon such questions at such conferences, the matter shall be settled by arbitration, the first party appointing one arbitrator and the second parties appointing one arbitrator, which arbitrators shall be disinterested parties having no interest with either side, and men of good reputation and having some special qualifications with reference to the questions to be determined, and the two arbitrators thus appointed shall request a Judge of the Superior Court of Orange County to act with them, or if such judge refuses to act, then request such

judge to appoint a third arbitrator, or if such judge refuses to appoint such third arbitrator, then the two so appointed shall appoint a third, and the three arbitrators so chosen and acting shall appoint a meeting and hear the claims of the respective parties, and such evidence as the arbitrators may deem necessary, and instead of receiving evidence the arbitrators can themselves make such investigation and inspection to enable them to determine the question, and a decision by a majority of such arbitrators shall be binding and conclusive upon the parties hereto, such decision to be in writing and a copy thereof furnished to each of the parties hereto, and thereafter the parties shall be governed in their actions and proceedings by such decision as to the question so determined.

TENTH

First Party Prevented from Using Water.

It is understood and agreed that the first party has the right and is entitled to use the water it may receive from any of the reservoirs mentioned in this agreement, on land within or without the watershed of Santiago Creek, as first party or its successors or assigns may see fit and determine from time to time or at any tim

It is understood that the main consideration to the first party for granting rights herein contained and co-operating with second parties in the development and storage of water in said creek is the right granted herein to take the water allocated to it in the said reservoirs and use the same on lands outside of the watershed, and such consideration will be removed or destroyed if the first party shall be prevented from exercising that right in the future.

It is therefore agreed that in the event any action or other legal process or proceeding be commenced against the first party to prevent, and the final judgment in which will prevent, the said first party taking and using said waters out of the watershed, the said first party will within ten days after any notice or process is served upon it, give to second parties notice in

writing of the commencement of such proceedings and furnish them with a copy of any complaints, petitions or other pleading showing the claims therein made, and the said first party shall appear in such proceedings and proceed to contest the same, and the said second parties will aid and assist the said first party in every way possible in the defense of such proceedings and will furnish its counsel or attorney to aid in the proceedings and will aid in procuring evidence, papers, and other things which may assist in the defense of said action, and will co-operate in every way in the defense thereof, and the cost and expense of defending such action or proceedings will be charges in as an expense of maintaining said reservoir, as hereinabove provided, and paid by the parties in the same proportion, and so long as said action or proceedings may be deferred or defeated, this contract shall remain in full force or effect; but if said action, proceedings or process shall result in a final judgment preventing the first party from using the water on lands out of the watershed and the said first party is thereby prevented from getting the full benefit of the development and the performance of this contract as herein set forth, then and in that event an equitable adjustment shall be made between the parties hereto so that the first party may take advantage of and realize upon its investment in said dam by sale or disposal of its interest, in whole or in part, to municipalities or others that may be able to receive the waters stored therein, and if said party of the first part is unable to so dispose of its said interest and unable to make use of its respective right to the waters therein, then the cost of maintenance of said dam shall be equitable adjusted between the parties hereto in accordance with the uses that they can make of the waters stored therein; that on the rendering of any such judgment, the parties hereto shall immediately, through their representatives, have a conference and shall attempt to equitably adjust their respective rights therein; that if the

said parties fail to reach an agreement by such conference, the question shall then be reached by arbitration in the same manner as provided in paragraph Ninth hereof. In case the water stored in said reservoir, or the rights of either party to the same, is taken from the party or parties hereto by any municipality through the exercise of the right of eminent domain, then in the consideration of damages or allowance that may be made to the parties hereto, or to the first party, to be paid by said municipality, the value of the land occupied by the said reservoir so taken shall be estimated and all consideration paid therefor shall go to the first party, in that the said land for the use of said reservoir is being furnished by first party in the first instance.

ELEVENTH

Barham Ranch Reservoir.

If at any time within five (5) years after the completion of the dam erected at the "Santiago Reservoir", the second parties herein should desire to erect and construct a dam on what is known as the "Barham Ranch" at a point known as "The Narrows", the Northeast corner of which dam will be South 59° 54' 30" East 872.70 feet from the Northwest corner, Section 19, Township 4 South, Range 8 West, S.B.M., the said second parties will thereupon notify the first party in writing of such desire, and, within one hundred twenty (120) days after receiving such notice, the said first party will notify the said second parties in writing whether the said first party desires to join with the said second parties in the construction and maintenance of said dam and the operation of reservoir formed by it.

If the said first party by such notice agrees to join in the construction of said dam, then the said second parties shall furnish the necessary land upon which to erect the dam and the right to flood all lands in the canyon owned by the second parties which will be overflowed or flooded by the waters in any reservoir formed by said dam, and the said first party will by proper deed convey to

the said second parties the right to flood all the lands in the canyon owned by said first party and which will be overflowed or flooded by the waters in any reservoir formed by said dam, and all rights of way necessary in connection with the same; and the said second parties shall thereupon proceed with the work of building and erecting said dam of approximately eighty feet in height and according to plans and specifications which shall first have been approved by the parties hereto, and the said second parties shall have the direction and supervision of the erection of said dam the same as in the provision of this contract concerning the erection of the "Santiago Reservoir" contained in paragraph Second hereof; and the said first party shall pay one-half of the cost thereof and the second parties the remaining cost, as also provided in said Second paragraph herein. After said dam is completed and water has been collected and stored in the reservoir formed by said dam, which reservoir shall be known as the "Lower Reservoir", the waters collected therein shall be divided and delivered, and the parties hereto shall be entitled to receive and use the waters in said reservoir on their respective lands in the following proportions, the first party shall have one half, and the second parties each one-fourth. Provided, however, that instead of the first party taking out of the "Lower Reservoir" the amount of water to which it may be entitled under the division, it, the said first party, may take such amount of water from the "Santiago Reservoir" in addition to the waters in said last named reservoir to which the first party may be entitled. In other words, the first party may take the same quantity from the "Santiago Reservoir" as it may be entitled to take from the "Lower Reservoir" to be delivered in the same manner. Should, however, the first party take all its share of water in the two reservoirs, as in this agreement provided, from the Santiago Reservoir, thereby preventing the second parties getting from the last named reservoir their pref-

erential right to said 1000 acre feet, they may take the same from the lower reservoir.

The prior right to 1000 acre feet provided for in the Fourth paragraph of this agreement, under all conditions, regardless of the number of dams that may be built, shall remain with said second parties.

At the completion of the dam and collection of water in the reservoir, the said second parties shall have the sole management of its operation and the same care as to the upkeep and repairs as herein provided in relation to the "Santiago Reservoir", and the cost of repairs and operation shall be divided between the parties in the same manner as herein provided for the "Santiago Reservoir."

In the event the first party's notice to second parties shall be that it does not desire to join in the construction and operation of the said "Barham Ranch" dam and the said second parties shall on their own account proceed with the construction of said dam, then said first party shall have no rights thereto nor any liabilities in connection therewith, nor shall any waters stored therein be considered in division of water stored in "Santaigo Reservoir", except that first party hereby agrees to deed to the said second parties all lands of the first party which would be overflowed by the back-waters from said dam approximately eighty feet in height and the reservoir formed by it at the price of an amount ten percent (10%) in excess of the value of the same for other purposes than water storage for the acreage, said value to be agreed upon by the parties hereto, and if unable to agree upon the same, then the value shall be determined by arbitration as hereinbefore provided in paragraph Ninth. It is agreed that this provision shall not be binding upon either of the parties hereto in case of suit brought by the second parties to condemn said lands for reservoir purposes. Said notice provided for at the commencement of paragraph Eleventh shall be given, even after five years, to said

first party if said second parties shall desire to build said dam.

TWELFTH

Fremont Canyon Reservoir.

It is further agreed that if at any time within five (5) years after the completion of the dam erected at the Santiago Reservoir it should be found practicable by the engineers of the parties hereto to construct a dam in the said Fremont Canyon to impound the storm waters which may flood therein, and a pipe line from said dam to convey the waters impounded therein to the "Santiago Reservoir", all the parties hereto and their successors in interest shall have the right to jointly enter upon said lands and construct the same, and when the parties hereto have so determined to construct a dam at said Fremont Canyon, an agreement in writing shall be made and signed by the parties hereto to the effect that they elect to exercise the privileges provided for in this paragraph.

Thereupon the said first party will convey to the said second parties the land necessary for the site of the dam which shall be located in said Fremont Canyon in the Northerly quarter of Block 70 of Irvine Subdivision, above referred to, and a right of way for pipe line from the reservoir formed by said dam to the "Santiago Reservoir" and for road purposes in going from one dam to the other, and for such other things as may be necessary to use in connection with the same, and the right to overflow and flood all lands back of said dam or by the reservoir formed by the dam, and thereupon the said second parties shall proceed to erect and construct a dam of such size and according to such plans and specifications as may then be agreed upon or provided by the engineers of the parties hereto, and when completed the said second parties shall have the supervision of the operation of the reservoir formed thereby, which shall be known as the "Fremont Canyon Reservoir", and the said second parties shall have charge of the upkeep and repair of said dam and the same shall be handled and operated in the same manner as herein provided for the "Santiago Reservoir",

and the cost of construction and all repairs shall be paid in the same proportion and in the same manner as herein provided for the "Santiago Reservoir", and all provisions of this contract relating to the "Santiago Reservoir" shall apply to the "Fremont Canyon Reservoir" and dam in so far as they may be applicable, but the second parties shall have no preferential right in the waters of the "Fremont Canyon Reservoir" over the said first party. That the water impounded by said "Fremont Canyon Reservoir" shall be conducted by a pipe line to the "Santiago Reservoir" and the same divided in the same manner and at the same time as the waters of the said "Santiago Reservoir". Or if the parties hereto shall then prefer, the same may be divided at or near the intakes to be installed at the dam of the "Fremont Canyon Reservoir", the first party being entitled to one-half thereof and the said second parties each one-fourth thereof.

In the event the said first party desires to erect the dam and form the reservoir thereby in Fremont Canyon, but the said second parties should not desire or choose to co-operate in the same, then it is agreed that the said first party may alone construct the said dam and form the said reservoir, and in that event shall pay the entire cost thereof and shall be entitled to all the benefits derived thereby; provided, however, that said first party shall not have the right to construct said dam alone at any time within five years from date hereof, without the consent of the second parties. Also provided that if said first party should erect said dam and form said reservoir in Fremont Canyon without the co-operation or aid of the said second parties, then the said first party shall have the right to empty and impound the waters of the "Fremont Canyon Reservoir" into the "Santiago Reservoir" when there is space in said reservoir for the reception of the same. All water received in said "Santiago Reservoir" from said "Fremont Canyon Reservoir" shall belong to and be measured and allotted to said first

party in addition to the water hereinbefore provided as going to said first party during each water year, a reasonable allowance being made for loss through evaporation or seepage, provided, however, if all water received during said water year, including the water coming from said "Fremont Canyon Reservoir", shall amount to 20,000 acre feet, then the same shall be allotted as first hereinbefore provided, with no special allotment given said first party. No special right in the water received from said "Fremont Canyon" dam or reservoir shall carry over from one water year to the next water year. Said notice provided for at the commencement of Paragraph Twelfth shall be given even after five years to said second parties if said first party shall desire to build said dam.

THIRTEENTH

Use of Reservoirs.

In the use and operation of the reservoir or reservoirs herein provided for, fences or other means may be provided to protect the waters impounded in such reservoirs from use by the public generally, and the members of the general public shall not have the right to use the same, but it is agreed that the parties hereto, under their joint control, may grant concessions on satisfactory terms to use the waters impounded in said reservoir or reservoirs for fishing, hunting, boating and such other uses as will not pollute or interfere with the use of said waters by the parties hereto for the purpose intended in such use.

At any time when the waters impounded in said reservoirs, or to be impounded therein, shall be deemed dangerous on account of the condition of said dam, either party hereto shall call attention to the said danger, and if they are unable to agree upon the necessary procedure relative to the same, then either party shall have the right to call the matter to the attention of the State Engineer, and upon his investigation or the investigation of engineers under his authority, it is found that said waters impounded in said reservoir, or any of said reservoirs, shall be dangerous, then no quantity of water shall be impounded in said dam or kept therein constituting

such dangerous condition, and that said procedure shall be followed until said dam or dams are put into a proper condition.

FOURTEENTH

That this agreement shall bind and inure to the benefit of the parties hereto, their successors and assigns, and all persons directly interested with either of the parties hereto; and this contract shall continue until the same is terminated by its own terms or by agreement of the parties hereto or by judgment of a court of competent jurisdiction.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed in the name and under the corporate seal of each party, by the duly authorized officers of the respective parties.

THE IRVINE COMPANY

SEAL

By JAMES IRVINE (signed)
President

By W. D. HELLIS (signed)
Secretary

CARPENTER IRRIGATION DISTRICT

SEAL

By L. W. Evans (signed)
President

By Donald S. Smiley (signed)
Secretary

SERRANO IRRIGATION DISTRICT

SEAL

By Willard Smith (signed)
President

By F. H. Collins (signed)
Secretary.

R E S O L U T I O N

- - - o o o O O o o o - - -

"Upon motion of C. F. Krauss, seconded by James G. Scarborough, the following resolution was adopted:-

> Be it resolved by the Board of Directors of The Irvine Company, a Corporation, having its place of business in Santa Ana, County of Orange, California,
>
> 1st. That the President and Secretary of this Corporation be and they are hereby authorized, instructed and empowered to execute and deliver in the name of and under the Corporate Seal of said Corporation, all deeds, conveyances, contracts, leases and other instruments in writing, which may be necessary to transfer, convey, or lease any lands or property sold, rented, or othersies disposed of by said corporation, and this authority shall include the assignment of mortgages.

The undersigned certifies that the foregoing is a true and correct copy of a resolution adopted at a meeting of the Board of Directors of The Irvine Company held June 21st, 1904 and recorded in Book 4, Page 143, Miscellaneous Records of Orange County.

W. D. Hellis (signed)
Secretary of said

THE IRVINE COMPANY

SEAL

Appendix F

Water Conservation & Water Supply Shortage Program

SERRANO WATER DISTRICT

Water Conservation & Water Supply Shortage Program

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Water Conservation & Water Supply Shortage Program

Appendix

AN RESOLUTION OF THE SERRANO WATER DISTRICT ESTABLISHING A WATER CONSERVATION AND WATER SUPPLY SHORTAGE PROGRAM AND REGULATIONS

Section I: Title.

This chapter will be known as the Serrano Water District Water Conservation and Water Supply Shortage Program.

Section II. Findings.

a. A reliable minimum supply of potable water is essential to the public health, safety and welfare of the people and economy of the southern California region.

b. Southern California is a semi-arid region and is largely dependent upon imported water supplies. A growing population, climate change, environmental concerns, and other factors in other parts of the State and western United States, make the region highly susceptible to water supply reliability issues.

c. Careful water management that includes active water conservation measures not only in times of drought, but at all times, is essential to ensure a reliable minimum supply of water to meet current and future water supply needs.

d. Article X, Section 2 of the California Constitution declares that the general welfare requires that water resources be put to beneficial use, waste or unreasonable use or unreasonable method of use of water be prevented, and conservation of water be fully exercised with a view to the reasonable and beneficial use thereof.

e. Article XI, Section 7 of the California Constitution declares that a city or county may make and enforce within its limits all local, police, sanitary, and other ordinances and regulations not in conflict with general laws.

f. California Water Code section 375 authorizes water suppliers to adopt and enforce a comprehensive water conservation program to reduce water consumption and conserve supplies.

g. The adoption and enforcement of a water conservation and supply shortage program is necessary to manage the the Serrano Water District's potable water supply in the short and long-term and to avoid or minimize the effects of drought and shortage within the Serrano Water District. Such program is essential to ensure a reliable and sustainable minimum supply of water for the public health, safety and welfare.

Section III. Declaration of Purpose and Intent.

a. The purpose of this chapter is to establish a water conservation and supply shortage program that will reduce water consumption within the Serrano Water District through conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within the Serrano Water District to avoid and minimize the effect and hardship of water shortage to the greatest extent possible.

b. This chapter establishes permanent water conservation standards intended to alter behavior related to water use efficiency at all times and further establishes three levels of water supply shortage response actions to be implemented during times of declared water shortage or declared water shortage emergency, with increasing restrictions on water use in response to worsening drought or emergency conditions and decreasing supplies.

Section IV. Definitions.

a. The following words and phrases whenever used in this chapter have the meaning defined in this section:

1. **"Person"** means any natural person or persons, corporation, public or private entity, governmental agency or institution, including all agencies and departments of Serrano Water District, or any other user of water provided by the Serrano Water District.

2. **"Landscape irrigation system"** means an irrigation system with pipes, hoses, spray heads, or sprinkling devices that are operated by hand or through an automated system.

3. **"Large landscape areas"** means a lawn, landscape, or other vegetated area, or combination thereof, equal to more than one (1) acre of irrigable land.

4. **"Single pass cooling systems"** means equipment where water is circulated only once to cool equipment before being disposed.

5. **"Potable water"** means water which is suitable for drinking.

6. **"Recycled water"** means the reclamation and reuse of non-potable water for beneficial use as defined in Title 22 of the California Code of Regulations.

7. **"Billing unit"** means the unit of water used to apply water rates for purposes of calculating water charges for a persons water usage and equals 100 cubic feet or seven hundred forty-eight (748) gallons of water.

Section V. Application

a. The provisions of this chapter apply to any person in the use of any potable water provided by the Serrano Water District.

b. The provisions of this chapter do not apply to uses of water necessary to protect public health and safety or for essential government services, such as police, fire and other similar emergency services.

c. The provisions of this chapter do not apply to the use of recycled water, with the exception of Section VI(a).

d. The provisions of this chapter do not apply to the use of water by commercial nurseries and commercial growers to sustain plants, trees, shrubs, crops or other vegetation intended for commercial sale.

e. This chapter is intended solely to further the conservation of water. It is not intended to implement any provision of federal, State, or local statutes, ordinances, or regulations relating to protection of water quality or control of drainage or runoff. Refer to the local jurisdiction or Regional Water Quality Control Board for information on any stormwater ordinances and stormwater management plans.

Section VI: Permanent Water Conservation Requirements – Prohibition Against Waste

The following water conservation requirements are effective at all times and are permanent. Violations of this section will be considered waste and an unreasonable use of water.

a. **Limits on Watering Hours**: Watering or irrigating of lawn, landscape or other vegetated area with potable water is prohibited between the hours of 10:00 a.m. and 4:00 p.m. Pacific Standard Time on any day, except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

b. **Limit on Watering Duration**: Watering or irrigating of lawn, landscape or other vegetated area with potable water using a landscape irrigation system or a watering device that is not continuously attended is limited to no more than fifteen (15) minutes watering per day per station. This subsection does not apply to landscape irrigation systems that exclusively use very low-flow drip type irrigation systems when no emitter produces more than two (2) gallons of water per hour and weather based controllers or stream rotor sprinklers that meet a 70% efficiency standard.

c. **No Excessive Water Flow or Runoff:** Watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive water flow or runoff onto an adjoining sidewalk, driveway, street, alley, gutter or ditch is prohibited.

d. **No Washing Down Hard or Paved Surfaces:** Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys, is prohibited except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high-pressure water broom.

e. **Obligation to Fix Leaks, Breaks or Malfunctions:** Excessive use, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected and in no event more than three (3) days of receiving notice from the Serrano Water District, is prohibited.

f. **Re-circulating Water Required for Water Fountains and Decorative Water Features**: Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited.

g. **Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a positive self-closing water shut-off nozzle or device. This subsection does not apply to any commercial car washing facility.

h. **Drinking Water Served Upon Request Only:** Eating or drinking establishments, including but not limited to a restaurant, hotel, cafe, cafeteria, bar, or other public place where food or drinks are sold, served, or offered for sale, are prohibited from providing drinking water to any person unless expressly requested.

i. **No Installation of Single Pass Cooling Systems**: Installation of single pass cooling systems is prohibited in buildings requesting new water service.

j. **No Installation of Non-re-circulating in Commercial Car Wash and Laundry Systems:** Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.

k. **Restaurants Required to Use Water Conserving Dish Wash Spray Valves**: Food preparation establishments, such as restaurants or cafes, are prohibited from using non-water conserving dish wash spray valves.

m. **Commercial Car Wash Systems:** Effective on January 1, 2009, all new commercial conveyor car wash systems must have installed operational re-circulating water systems, or must have secured a waiver of this requirement from the Serrano Water District.

Section VII: Level 1 Water Supply Shortage

a. A Level 1 Water Supply Shortage exists when the Serrano Water District determines, in its sole discretion, that due to drought or other water supply conditions, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon the declaration by the Serrano Water District of a Level 1 Water Supply Shortage condition, the Serrano Water District will implement the mandatory Level 1 conservation measures identified in this section.

b. **Additional Water Conservation Measures:** In addition to the prohibited uses of water identified in Section VI, the following water conservation requirements apply during a declared Level 1 Water Supply Shortage:

1. **Limits on Watering Days:** Watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to three days per week on a schedule established and posted by the Serrano Water District. During the months of November through March, watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to no more than one day per week on a schedule established and posted by the Serrano Water District. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than two (2) gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

2. **Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within seventy-two (72) hours of notification by the Serrano Water District unless other arrangements are made with the Serrano Water District.

Section VIII. Level 2 Water Supply Shortage

a. A Level 2 Water Supply Shortage exists when the Serrano Water District determines, in its sole discretion, that due to drought or other water supply conditions, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon the declaration by the Serrano Water District of a Level 2 Water Supply Shortage condition, the Serrano Water District will implement the mandatory Level 2 conservation measures identified in this section.

b. **Additional Conservation Measures:** In addition to the prohibited uses of water identified in Section VI and VII, the following additional water conservation requirements apply during a declared Level 2 Water Supply Shortage:

1. **Watering Days:** Watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to two days per week on a schedule established and posted by the Serrano Water District. During the months of November through March, watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to no more than one day per week on a schedule established and posted by the Serrano Water District. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than two (2) gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

2. **Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within forty-eight (48) hours of notification by the Serrano Water District unless other arrangements are made with the Serrano Water District.

3. **Limits on Filling Ornamental Lakes or Ponds**: Filling or re-filling ornamental lakes or ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to declaration of a supply shortage level under this ordinance.

4. **Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to, any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not, is prohibited except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, by high pressure/low volume wash systems, or at a commercial car washing facility that utilizes a re-circulating water system to capture or reuse water.

5. **Limits on Filling Residential Swimming Pools & Spas:** Re-filling of more than one foot and initial filling of residential swimming pools or outdoor spas with potable water is prohibited.

Section IX. Level 3 Water Supply Shortage – Emergency Condition

a. A Level 3 Water Supply Shortage condition is also referred to as an "Emergency" condition. A Level 3 condition exists when the Serrano Water District declares a water shortage emergency and notifies its residents and businesses that a significant reduction in consumer demand is necessary to maintain sufficient water supplies for public health and safety. Upon the declaration of a Level 3 Water Supply Shortage condition, the Serrano Water District will implement the mandatory Level 3 conservation measures identified in this section.

b. **Additional Conservation Measures:** In addition to the prohibited uses of water identified in Section VI, VII, and VIII, the following water conservation requirements apply during a declared Level 3 Water Supply Shortage Emergency:

1. **No Watering or Irrigating:** Watering or irrigating of lawn, landscape or other vegetated area with potable water is prohibited. This restriction does not apply to the following categories of use, unless the Serrano Water District has determined that recycled water is available and may be applied to the use:

   i. Maintenance of vegetation, including trees and shrubs, that are watered using a hand-held bucket or similar container, hand-held hose equipped with a positive self–closing water shut-off nozzle or device;

   ii. Maintenance of existing landscape necessary for fire protection;

   iii. Maintenance of existing landscape for soil erosion control;

   iv. Maintenance of plant materials identified to be rare or essential to the well-being of protected species;

   v. Maintenance of landscape within active public parks and playing fields, day care centers, golf course greens, and school grounds, provided that such irrigation does not exceed two (2) days per week according to the schedule established in Section VIII(b)(1) and time restrictions in Section VI(a) and (b)(1);

   vi. Actively irrigated environmental mitigation projects.

2. **Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within twenty four (24) hours of notification by the Serrano Water District unless other arrangements are made with the Serrano Water District.

3. a. **No New Potable Water Service**: Upon declaration of a Level 3 Water Supply Shortage Emergency condition, no new potable water service will be provided, no new temporary meters or permanent meters will be provided, and no statements of immediate ability to serve or provide potable water service (such as, will-serve letters, certificates, or letters of availability) will be issued, except under the following circumstances:

      1. A valid, unexpired building permit has been issued for the project; or
      2. The project is necessary to protect the public health, safety, and welfare; or

3. The applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the Serrano Water

4. **Discontinue Service**: The Serrano Water District, in its sole discretion, may discontinue service to consumers who willfully violate provisions of this section.

5. **No New Annexations:** Upon the declaration of a Level 3 Water Supply Shortage condition, the Serrano Water District will suspend consideration of annexations to its service area. This subsection does not apply to boundary corrections and annexations that will not result in any increased use of water.

Section X. Procedures for Determination / Notification of Water Supply Shortage

a. **Declaration and Notification of Water Supply Shortage:** The existence of Level 1, Level 2 or Level 3 Water Supply Shortage conditions may be declared by resolution of the Serrano Water District adopted at a regular or special public meeting held in accordance with State law. The mandatory conservation requirements applicable to Level 1, Level 2 or Level 3 conditions will take effect on the tenth day after the date the shortage level is declared. Within five (5) days following the declaration of the shortage level, the Serrano Water District must publish a copy of the resolution in a newspaper used for publication of official notices. If the Serrano Water District activates a water allocation process, it must provide notice of the activation by including it in the regular billing statement or by any other mailing to the address to which the Serrano Water District customarily mails the billing statement for fees or charges for on-going water service. A water allocation will be effective on the fifth day following the date of mailing or at such later date as specified in the notice.

Section XI. Hardship Waiver

a. **Undue and Disproportionate Hardship:** If, due to unique circumstances, a specific requirement of this chapter would result in undue hardship to a person using water or to property upon which water is used, that is disproportionate to the impacts to water users generally or to similar property or classes of water users, then the person may apply for a waiver to the requirements as provided in this section.

b. **Written Finding:** The waiver may be granted or conditionally granted only upon a written finding of the existence of facts demonstrating an undue hardship to a person using water or to property upon which water is used, that is disproportionate to the impacts to water users generally or to similar property or classes of water use due to specific and unique circumstances of the user or the user's property.

1. **Application**: Application for a waiver must be on a form prescribed by the Serrano Water District and accompanied by a non-refundable processing fee in an amount set by the Serrano Water District resolution.

2. **Supporting Documentation**: The application must be accompanied by photographs, maps, drawings, and other information, including a written statement of the applicant.

3. **Required Findings for Waiver:** An application for a waiver will be denied unless the Serrano Water District finds, based on the information provided in the application, supporting documents, or such additional information as may be requested, and on water

use information for the property as shown by the records of the Serrano Water District or its Agent, all of the following:

i. That the waiver does not constitute a grant of special privilege inconsistent with the limitations upon other residents and businesses;

ii. That because of special circumstances applicable to the property or its use, the strict application of this chapter would have a disproportionate impact on the property or use that exceeds the impacts to residents and businesses generally;

iii. That the authorizing of such waiver will not be of substantial detriment to adjacent properties, and will not materially affect the ability of the Serrano Water District to effectuate the purpose of this chapter and will not be detrimental to the public interest; and

iv. That the condition or situation of the subject property or the intended use of the property for which the waiver is sought is not common, recurrent or general in nature.

4. **Approval Authority**: The General Manager must act upon any completed application no later than ten (10) days after submittal and may approve, conditionally approve, or deny the waiver. The applicant requesting the waiver must be promptly notified in writing of any action taken. Unless specified otherwise at the time a waiver is approved, the waiver will apply too the subject property during the period of the mandatory water supply shortage condition. The decision of the General Manager will be final.

Section XII. Penalties and Violations

a. **Misdemeanor:** Any violation of this chapter may be prosecuted as a misdemeanor punishable by imprisonment in the county jail for not more than thirty (30) days, or by a fine not exceeding one thousand dollars ($1,000), or by both.

b. **Penalties:** Penalties for failure to comply with any provisions of the ordinance are as follows:

1. **First Violation:** The Serrano Water District will issue a written warning and deliver a copy of this ordinance by mail.

2. **Second Violation:** A second violation within the preceding twelve (12) calendar months is punishable by a fine not to exceed one hundred dollars ($100).

3. **Third Violation:** A third violation within the preceding twelve (12) calendar months is punishable by a fine not to exceed two hundred and fifty ($250).

4. **Fourth and Subsequent Violations:** A fourth and any subsequent violation is punishable by a fine not to exceed five hundred ($500).

i. **Water Flow Restrictor:** In addition to any fines, the Serrano Water District may install a water flow restrictor device of approximately one gallon per minute capacity for services up to one and one-half inch size and comparatively sized

restrictors for larger services after written notice of intent to install a flow restrictor for a minimum of forty eight (48) hours.

5. **Discontinuing Service:** In addition to any fines and the installation of a water flow restrictor, the Serrano Water District may disconnect a customer's water service for willful violations of mandatory restrictions in this chapter.

c. **Cost of Flow Restrictor and Disconnecting Service:** A person or entity that violates this ordinance is responsible for payment of the Serrano Water District's charges for installing and/or removing any flow restricting device and for disconnecting and/or reconnecting service per the Serrano Water District's schedule of charges then in effect. The charge for installing and/or removing any flow restricting device must be paid to the Serrano Water District before the device is removed. Nonpayment will be subject to the same remedies as nonpayment of basic water rates.

d. **Separate Offenses**: Each day that a violation of this ordinance occurs is a separate offense.

e. **Notice and Hearing**:

1. The Serrano Water District will issue a Notice of Violation by mail or personal delivery at least ten (10) days before taking enforcement action. Such notice must describe the violation and the date by which corrective action must be taken. A customer may appeal the Notice of Violation by filing a written notice of appeal with the Serrano Water District no later than the close of business on the day before the date scheduled for enforcement action. Any Notice of Violation not timely appealed will be final. Upon receipt of a timely appeal, a hearing on the appeal will be scheduled, and the Serrano Water District will mail written notice of the hearing date to the customer at least ten (10) days before the date of the hearing.

2. Pending receipt of a written appeal or pending a hearing pursuant to an appeal, the Serrano Water District may take appropriate steps to prevent the unauthorized use of water as appropriate to the nature and extent of the violations and the current declared water Level condition.

Section XIII. Severability

If any section, subsection, sentence, clause or phrase in this chapter is for any reason held invalid, the validity of the remainder of the chapter will not be affected. The Board of Directors hereby declares it would have passed this chapter and each section, subsection, sentence, clause or phrase thereof, irrespective of the fact that one or more sections, subsections, sentences, clauses, or phrases or is declared invalid.

Other Measures Available for Consideration

a. **Water Allocations and Mandatory Reductions**

1. **Water Allocations / Water Budget**: The Serrano Water District will activate a water allocation process using a method that does not in effect penalize persons for prior implementation of conservation methods or installation of water-saving devices. The Serrano Water District must provide notice of activation of the allocation process by including it in the regular billing statement for the fee or charge or by any other mailing to the address to which the Serrano Water District customarily mails the billing statement for fees or charges for on-going water service.

   Following the effective date of the water allocation, any person using water in excess of the allocation will be subject to a 20% penalty for each billing unit of water in excess of the allocation. The penalty for excess water usage will be cumulative to any other remedy or penalty that may be imposed for violation of this ordinance.

b. **Large Landscape Areas – Rain Sensors**: Large landscape areas, such as parks, cemeteries, golf courses, school grounds, and playing fields, that use landscape irrigation systems to water or irrigate, must use landscape irrigation systems with rain sensors that automatically shut off such systems during periods of rain or irrigation timers which automatically use information such as evapotranspiration sensors to set an efficient water use schedule.

c. **Construction Purposes**: Recycled or non-potable water must be used for construction purposes when available.

d. **Water Recycling Required if Available**: The use of potable water, other than recycled water, is prohibited for specified uses after the Serrano Water District has provided to the user an analysis showing that recycled water is available, a cost-effective alternative to potable water for such uses and the user has had a reasonable time, as determined by the Serrano Water District, to make the conversion to recycled water.

e. **Water Recycling – New Service:** Prior to the connection of any new water service, an evaluation must be done by the Serrano Water District to determine whether recycled water exists to supply all or some of the water needed and recycled water must be utilized to the extent feasible.

f. **Reporting Mechanism - Hotline**: The Serrano Water District will establish a water waste hotline for residents to report violations of this chapter.

g. **State Model Landscape Ordinance:** The Department of Water Resources State Model Landscaping Ordinance is adopted by reference and incorporated as part of this Chapter. The full text of the Model Landscaping Ordinance is available on the Serrano Water District website at www.serranowater.org and a copy is maintained with the Serrano Water District.

APPENDIX

WATER CONSERVATION ORDINANCE SUMMARY TABLE

Permanent	Level 1	Level 2	Level 3 – Emergency	Other Provisions for Consideration
Restrictions o No Watering: 10:00 am-4:00 pm, except by hand o Irrigation system limit of 15 minutes o No excessive water flow or runoff o No washing down hard or paved surfaces o Obligation to fix leaks in reasonable time (within 3 days of notice) o Fountains only with re-circulating water o Wash vehicles only with bucket or shut-off nozzle o Restaurants only serve water on request	Same as Permanent + o Watering limited to 3 days a week o Fix leaks within 72 hours	Same as Permanent & Level 1 + o Watering limited to 2 days a week o Fix leaks within 48 hours o No filling or re-filling ornamental lakes or ponds o Wash vehicles only at car wash with re-circulating system o No filling residential pools or outdoor spas	Same as Permanent, Level 1 & Level 2 + o No watering or irrigating with certain exceptions o Fix leaks within 24 hours o No new potable water service o No new annexations to service areas	o Water allocation requirements and penalties for exceeding allotment o Mandatory % reduction and penalties for overage o Large landscape areas must have rain sensors o Departments prepare annual conservation reports.

PASSED AND ADOPTED by the Board of Directors of Serrano Water District at a regular meeting on March 17, 2009, by the following roll call vote:

AYES: DIRECTORS:

NOES: DIRECTORS:

ABSENT: DIRECTORS:

Jerry Haight, President

David H. Noyes, Secretary